November-December 1960

BER

Business and Economic Review

University of Missouri

University of Missouri

BUSINESS AND ECONOMIC REVIEW

Vol. 1 November-December 1960 No. 6

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THE BUSINESS AND ECONOMIC REVIEW

is published bi-monthly by the Bureau of Business and Economic Research, School of Business and Public Administration, University of Missouri, Columbia, Missouri. Second class postage paid at Columbia, Missouri.

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The Structure and Functions of Large Metropolitan Economies

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Research interest in the economies of the nation's metropolises has experienced a marked rise in recent years. That such interest is well placed is confirmed by preliminary reports from the 1960 Census of Population. The United States economy, which was largely agrarian through the 19th Century, is at present not only centered in urban communities but is rapidly gravitating toward the large metropolitan areas of the country. In 1900 there were only six metropolitan areas with populations of 500,000 or more. By 1950 the number had risen to 33. Preliminary Census figures for 1960 indicate the current number has jumped to 47. Of these 47 large metropolitan areas, the largest 10 alone contain a fourth of our national population and over a fourth of all jobs (including both agricultural and nonagricultural) in the nation.

METROPOLITAN PRODUCTIVITY

This phenomenal growth of our metropolitan communities is explained in great measure by economic forces. The metropolis is an area of enormously high productivity. The metropolitan complex somehow enables facilities and skills to be mixed more effectively for the production of many types of goods and services than is possible under other conditions. We know something of how this takes place but less than we should. The metropolis permits an extreme degree of division of labor to take place while increasing the flexibility of operations at the same time. The higher productivity resulting from these developments creates a differential in the productive potentials of individuals between the metropolis and the rural areas and smaller towns. This, in turn, provides a strong attraction to pull labor and the owners of other productive facilities to the metropolis.[1]

[1] Hans Blumenfeld points out that no city which passed the half-million mark during the past century has subsequently fallen below that level. ("The Economic Base of the Metropolis," **Journal of the American Institute of Planners,** Vol. 23, Spring, 1955, p. 132.) This gives some indication of how pervasive the growth factor is among the larger metropolitan communities.

The economy of the metropolis is, therefore, a key to understanding the social phenomenon which is the metropolis. At the same time, an understanding of the metropolitan economy, because of the high productivity it engenders, the huge number of resources it utilizes, and the unique functions it performs, gives us important insights into the operation of the regional as well as the national economy.

In spite of the importance of the metropolis, however, comparatively little is known about the nature and behavior of the metropolitan economy itself. How does it behave as it grows? Is Chicago merely an economic multiple of Peoria? Is New York simply a bigger Dallas or Atlanta? Or does growth involve a metamorphosis of some kind in the nature of the city economy and in what it does? Metropolitan economic research has, for the most part, taken one of two forms. It has either emphasized the problems of establishing an adequate analytical framework[2] or it has concentrated on the features (including the troubles) of individual local economies.[3] Both these objectives are worthwhile. But much less has been done in the direction of uncovering the characteristics which typify metropolitan economies in general.[4] This is to say that we know comparatively little about the essentials of metropolitan economic organization.

As a result, solutions to metropolitan economic (and other social problems as well) have been sought on an *ad hoc* basis. Solutions derived from such an approach may very well aggravate other metropolitan problems. They may even be wasteful in themselves because the extent of the problem with which they grapple may not be fully conceived. Yet we exhibit a marked lack of sensitivity toward even these specific metropolitan problems. The total federal governmental expenditures for all programs concerned with housing, urban renewal, and slum clearance projects to 1958 at least had been less, for example, than its outlays for the agricultural price support of potatoes alone.[5]

The need for understanding of the metropolitan economy is of even greater importance to Missouri than to many other states. In Missouri metropolitanization is considerably in advance of the national average. Well over half the state's population and jobs are found in those portions of the Kansas City and St. Louis metropolitan areas which lie within the state's boundaries. In terms of income generation, the dominating position oc-

[2] In this connection, the focus has been predominantly on the concept of the economic base of the metropolis, input-output analysis, and concepts from Keynesian analysis applied to the local economy. (cf, for example, Pfouts, R. W., ed., **The Techniques of Urban Economic Analysis** Chandler-Davis: West Trenton, N. J., 1960). Each of these analytical concepts, it may be noted, are adaptions of analytical techniques which were developed for the national economy. This indicates an understandable, but possibly questionable, tendency to regard the metropolitan economy as a small replica of a national economy.

[3] Numerous individual studies exist of individual cities. These, of course, do carry some relevance for the study of other cities and suggest certain general relationships for metropolitan areas. For a good example, cf., Hoover, E. M. and Vernon, R., **Anatomy of a Metropolis** (Harvard University Press, Cambridge, 1959).

[4] But see, e. g., Alexanderson, G., **The Industrial Structure of American Cities** (University of Nebraska Press: Lincoln, 1956); Morrissett, I., "The Economic Structure of American Cities," **Papers and Proceedings of the Regional Science Association**, 1958, Vol. IV; and Picard, J. P., **Metropolitanization in the United States** (Urban Land Institute: New York, 1959) Research Monograph 2; Florence, P. S., "Economic Efficiency in the Metropolis," **The Metropolis in Modern Life**, Fisher, R. M., ed. (Doubleday: Garden City, N. Y., 1955) and, less adequately, Clark, C., "The Economic Functions of a City in Relation to its Size," **Econometrica**, April, 1945.

[5] Palmer, H. C., "National Program Affecting Local Economic Growth," **The Little Economies**, (Committee for Economic Development: New York, 1958) p. 47.

cupied by these two large metropolises is even more impressive. Thus, while most of the area of the state is rural, dotted with relatively small towns, Missourians to a degree well beyond the average for the nation as a whole are living and working and are in fact a part of large metropolitan communities. To say the least, a better understanding of the metropolis would seem desirable.

METHOD OF STUDY

Some indication of metropolitan economic structure and development can be gathered from the data provided through the Bureau of the Census. We chose to use the 1950 Census of Population because it presents a wider panorama of the metropolitan economy than other recent Census material.[6] By grouping the Standard Metropolitan Areas according to population ranges which we felt constituted natural dividing points, some differences can be discerned. While the relatively small number of cities in each of these population ranges disallows conclusions of great refinement, the cities are sufficiently diverse to make it likely that other influencing factors are substantially canceled out or that they are at least materially reduced in significance in all save one or two special circumstances of which we take note below. The relationships derived from the data, in other words, we believe to be between the economic structure of the cities and their population size and not the product of other variables.

Moreover, if we can assume that each of the three groups of cities included in our study are representative samples from a universe of cities of their size range, the statistical results obtained from the samples will suggest roughly the characteristics which we may expect to find in any other random sample of cities from that universe. We do make this assumption because there is evidence that cities in the same population range tend to have certain common economic features.[7] There is also empirical evidence to suggest that cities of certain sizes are able to perform particular functions more effectively and more economically than cities of different population sizes.[8] Thus, we have some reason to believe that as the metropolitan economy grows, typical structural features appear at different population sizes. These would be discernible from our samples. In addition, since the metropolitan functions demanded by a national or broad interregional economy remain in relatively constant proportions to one another as the economy expands, a new group of cities growing into any one of the ranges of population size which we consider here, will likely have many of the same attributes found in the sample group. Our universe of cities, thus, includes the cities in our present study (from the 1960 Census) plus other U. S. cities which have already or will in the near future meet the necessary size qualifications. With somewhat greater reserve, we might also include the metropolises of other highly industrialized countries of substantial size and with institutional backgrounds similar to that of the U. S.[9]

[6] Comparable material in the 1960 Census of Population will not become available until the latter half of 1961. The Censuses of Business and Manufactures do not contain data on such sectors of the economy as finance, transportation, public utilities, telecommunications, and public administration.

[7] Cf., Morrisett, op. cit., Clark, op. cit., and Sargent, op. cit.

[8] Cf., for example, Sargent, op. cit.

[9] The reader may not wish to accept this assumption. The material presented is, however, a useful description of the metropolitan areas of over half a million in the United States as of 1950, in any case, and such descriptive material serves as one of the best guides as to the shape of future cities in these population ranges.

CITY SIZE GROUPS

Since our interest is in large metropolitan areas, the study includes all Standard Metropolitan Areas in the U. S. above 500,000 in population in 1950 except Washington, D. C.[10] Washington was excluded on grounds that it is atypical in almost every particular and is unique. Our data are thus taken from the 32 remaining Standard Metropolitan Areas above 500,000. These 32 cities are divided into three population range groups: I (500,000-750,000, including 15 cities), II (750,000-2,000,000, including 9 cities), and III (above 2,000,000, including 8 cities.) Population differences within each range are ignored and only the size groups are compared.

The industry of employment of the population of a Standard Metropolitan Area gives an approximation of the relative importance of different industries to that area. While the reflection it gives is less than perfect, we feel it is indicative of the structure of the area's economy. Accordingly, the economy of each of these cities was divided into 37 industries in which the city's population was employed.[11] These industries are grouped in different ways in the subsequent sections for purposes of analysis.

STRUCTURAL TRENDS

Table 1 indicates the percentage of total employment in three groups of industries classified according to rank of employment within the metropolitan area by the three metropolitan size groups. These figures are the averages for each metropolitan size group of the sums of the 5 industries of highest employment within each metropolitan area, of the sums of the 21 industries of next highest employment, and of the sums of the 10 industries of lowest employment.[12] Construction, the 37th industry, has been omitted from these groupings on the ground that its relative size is dominantly a product of the rate of metropolitan growth rather than of the absolute size of the metropolis.

The differences which are indicated in Table 1 between different city size groups for each industrial employment category have been statistically analyzed to determine their significance.[13] Between the averages for each of the three em-

[10] The 32 Standard Metropolitan Areas in descending order of population are: New York and Northeast New Jersey, Chicago, Los Angeles, Philadelphia, Detroit, Boston, San Francisco-Oakland, Pittsburgh, St. Louis, Cleveland, Baltimore, Minneapolis-St. Paul, Buffalo, Cincinnati, Milwaukee, Kansas City, Houston, Providence, Seattle (Wash.), Portland (Ore.), New Orleans, Atlanta, Dallas, Louisville, Denver, Birmingham, San Diego, Indianapolis, Youngstown, Albany-Schenectady-Troy, Columbus, San Antonio.

[11] For a listing of the 37 industries see footnote 14. These industries are derived from the Census of Population which gives a 41 industry breakdown under the Economic Characteristics of the Population. Several of the Census categories are largely inappropriate to the metropolitan industrial structure: agriculture and forestry and fishing. These were omitted from the total of metropolitan employment from which the percentage figures we used were calculated. So was the category, Industries Not Reported, a negligible figure. Private and Public Education Services were combined to form the category of Education Services.

[12] The grouping of the five industries of highest employment was chosen as a compromise which avoids, on the one hand, giving undue weight to one or two industries of high employment when the metropolitan area is otherwise unspecialized while not, on the other hand, including so many industries as to wash out all differences in employment distribution among the industries of different cities. Ten industries were used to comprise the group with lowest employment simply because in many of the cities there were about 10 industries with less than one per cent of the total metropolitan employment. The remaining 21 industries of the 37 (construction omitted) constitute the middle group.

[13] Median values were also obtained for each employment groups in each city size bracket as another measure of general trend. The medians and their differences give results comparable to those presented in Table 1 by the arithmetic means.

ployment groups are all almost certainly significant. (The chance that the difference between any of the employment groups in the two city size ranges is merely random variation due to chance alone is less than 0.1 in 100.) We can, therefore, expect differences in the direction of those indicated in Table 1 in a comparison of any two groups of randomly selected cities from each of the two population ranges.

Between cities of group II and III the differences in the averages of the top 5 and next 21 industries are of such magnitude that they may be significant for our purposes, but the figures are less definitive of differences associated with differences in population. (Differences in the averages of this size would occur something less than 10 times in 100 if the difference were the consequence of variations due to random chance alone.) The differences between the 10 industries of lowest employment is certainly *not* significant.

The differences between the averages of the group I and II cities are sufficiently clear-cut to state with substantial assurance that cities in the population range of 750,000-2,000,000 possess, as a group, a different set of employment distribution characteristics from those of cities in the 500,000-750,000 range. On the other hand, in comparing the averages for cities in the 750,000-2,000,000 range with those of cities above 2,000,000, it appears that between these two population ranges the direction of structural adjustment of the metropolitan economy is reversed from what it was between the size I and size II cities. We do not feel the differences which are indicated in Table I are sufficiently great to warrant this conclusion as a generalization appropriate beyond the cities in this study. What we do claim with some con-

TABLE 1
PERCENTS OF TOTAL EMPLOYMENT BY INDUSTRIAL EMPLOYMENT RANK FOR THREE METROPOLITAN SIZE GROUPS (AVERAGES)

Industrial Employment Rank in the Metropolitan Economy	I 500,000-750,000	Difference (II-I)	II 750,000-2,000,000	Difference (III-II)	III Above 2,000,000
5 Industries of Highest Employment (Excluding Construction)	38.85%	—6.78%	32.07%	+2.82	34.89%
Next 21 Industries in Size of Employment	48.55	+5.15	53.70	—2.14	51.56
10 Industries of Lowest Employment	5.38	+2.44	7.82	—0.27	7.55
	92.78		93.59		94.00
(Construction)	7.20		6.39		5.99
Total	99.98*		99.98*		99.99*

*Totals deviate from 100 per cent due to rounding errors.

fidence is that *the differences between the group II and III cities singularly fail to confirm a continuation of the trend of structural changes which is indicated between the cities of population ranges I and II.*

This conclusion is important in that it is a departure from general opinion. The per cent of total metropolitan employment in the industries of higher employment is one means of measuring specialization which indicates the degree to which the resources of the metropolitan area are allocated to these few industries. On this basis, specialization decreases between city size groups I and II but not between size groups II and III. It has usually been thought that specialization decreases as metropolitan population rises. Our conclusions show this is not so beyond the 750,000-2,000,000 range in so far as it means a decrease in the proportion of total metropolitan employment in the top industries.

A contrasting view of the metropolitan economic structure is provided by Table 2. In this table the 37 industries have been classified as either manufacturing or nonmanufacturing. These two broad categories are further subdivided into 11 industrial groups.[14] The major difference in industrial structure as shown in Table 2 between metropolitan areas of size group I and size group II is the substantial increase in the share of the local economy devoted to manufacturing and the relative decline in the proportion of the economy involved in nonmanufacturing activities.[15]

MANUFACTURING IMPORTANT

The difference between the averages for employment in manufacturing in these two city size groups is shown by statistical test to be a significant one. (Random chance would record a difference of this size less than 0.5 times in 100.) We are persuaded by this to conclude that cities within the two population ranges considered come from different universes so that the differences in the role of manufacturing should be expected between any other pair of city groups randomly drawn from the two population ranges. We may feel reasonably safe, therefore, in agreeing with the generally accepted notion that it is characteristic of cities of larger population to have a greater proportion of their economies devoted to manufacturing than cities of smaller size—in so far as the comparison is of cities in the 500,000-750,000 class with those in the 750,000-2,000,00 class.

[14] The 37 industries are grouped as follows in the 11 industrial categories: **Durable Manufacturing:** furniture, lumber, and wood products; primary metals industries; fabricated metals industries; machinery, except electrical; electrical machinery and equipment; motor vehicles and equipment; transportation equipment exclusive of motor vehicles; other durable goods. **Nondurable Manufacturing:** food and kindred products; textile mill products; apparel and other fabricated textile products; printing, publishing, and allied industries; chemicals and allied products; other non-durable goods; not specified manufacturing industries. **Transportation and Communications:** railroads and railway express; trucking service and warehousing; other transportation; telecommunications. **Utilities:** utilities and sanitary services. **Trade:** wholesale trade; food, dairy products, and milk, retail; eating and drinking places; other retail. **Finance and Business Services:** finance, insurance, and real estate; business services; repair services. **Personal Services:** private households; hotels and lodging places; other personal services. **Professional Services:** entertainment and recreation services; medical and health services; educational services; other professional services. **Public Administration. Mining. Construction.**

[15] A comparison of medians for each of these industrial categories in each city size group disclosed substantially the same pattern as the arithmetic means in Table 2. Such deviations as did occur served to provide stronger evidence for the conclusions we draw from the average in Table 2, with the sole exception of Public Administration, where differences are somewhat smaller between medians than between means.

The figures in Table 2 help explain why substantial attention is directed toward the manufacturing sector of the metropolitan economy and its role in the expansion or growth process. Where cities are moving from group I to group II, manufacturing is probably one of the strategic factors since, on the average among these cities, its growth outpaces that of the economy as a whole. This need not be true for every city stepping from one size category to the next larger one. But it is of sufficient likelihood to be given careful study.

IN SIZE III CITIES

In comparing manufacturing percentages of the group II and group III cities it is apparent that the difference in the size of the manufacturing sector is, on the average, much smaller than that between group I and II cities. Statistical analysis of the difference discloses that it is so tiny that it fails to carry the implications noted for the difference between the manufacturing averages of group I and II cities. In other words, the degree of orientation to or specialization in manufacturing cannot be considered a characteristic difference between cities in groups II and III. This finding is of particular interest because like our findings concerning the distribution of employment in the metropolitan economy, it fails, over these ranges, to substantiate the relationship found at lesser population levels between population size and proportion of the metropolis devoted to manufacturing. Here, then, we have another particular in which the established conception of metropolitan development appears to contain a flaw.

This conclusion should not be interpreted as applicable to individual metropolitan areas, of course. Indications of general trends do not give assurance of conformity by individual members of the group. However, while expansion of manufacturing may remain a primary growth stimulant for one or a few cities between these ranges, its impact on growth for cities moving from size group II to size group III is decidedly less significant, when considered for the group, that it is among cities of smaller size (at least down to the 500,000-750,000 bracket.) It should also be noted that whenever one city has retained a heavy dependence upon manufacturing to provide its growth stimulus, other cities must, because of the behavior of the average, have their growth stimulus rooted in the relative expansion of nonmanufacturing activities. In this range of growth there is much less justification, therefore, for devoting attention exclusively to manufacturing as the prime source of further metropolitan growth.

One final clarification concerning manufacturing is probably needed. The percentage for durable manufacturing is higher for group III cities than for group II cities. The nondurable percentages, by contrast, is lower. This divergence in the behavior of the two subcategories of manufacturing may be an important consideration in explaining the overall behavior of manufacturing between the two city size groups. But the differences recorded in Table 2 do not offer a basis for generalization of this sort by themselves. Neither trend is sufficiently large to warrant the conclusion that the differences are characteristic between cities in population ranges II and III.[16] However, the discussion of Table 4 below

[16] Differences between means of group II and group III cities is insignificant. Comparing medians offers another test. The median in group II cities for durables is 18.41 per cent. In group III cities the median pair is 16.66-15.12 per cent. This reverses the relationship shown by the means in Table 2. In group I cities the median is 14.52 per cent. For nondurables the medians follow the same pattern as the means.

offers some support to the thesis that durables and nondurables manufacturing are associated in a different manner with size of population between cities of size II and size III groups.

Since we are dealing with the total employment in the metropolitan areas, the comments made concerning manufacturing as a whole may be transferred with little adjustment to the nonmanufacturing sector. Stating the conclusions should, therefore, suffice. The role of nonmanufacturing activity in the economies of cities in group II is relatively less important than in cities of size group I. Between the size group II and size group III, however, cities appear at least to hold their relative position and, perhaps, even to improve it somewhat.

SPECIFIC INDUSTRIAL SECTORS

Turning to particular nonmanufacturing categories, the most important differentials shown in Table 2 between city size groups appear to be in the categories of finance and business services, professional services, and public administration.[17] Each of these categories, it will be noted, shows a difference in the direction of change between the lower and middle and between the middle and largest groups of cities. These changes in the direction of differences constitute fairly definite breaks and statistical inference can be established in each of these industrial categories. (The smallest such change among all of these categories involves a difference in one direction so large that it would occur as a result of chance alone less than 2.5 times in 100 with a difference in the opposite direction of less than 20 times in 100.) The magnitude and direction of these differences changes enough to imply that the relationship which is established between population size and proportion of total metropolitan employment engaged in the category for city groups I and II cannot be substantiated between group II and III cities. Each of these individual categories follows the same pattern as nonmanufacturing as a whole, in this respect.[18] In other terms, the decline in degree of specialization in these activities ceases when city size group II is achieved.

It is of some interest to observe, by contrast, that the differences in percentages for utilities between the 500,000-750,000 and the 750,000-2,000,000 ranges is statistically insignificant but between the latter range and that above 2,000,000, this percentage declines enough to be statistically important. (It would occur less than 2.5 times in 100 by random chance.) It would appear that the utilities, for some reason, may typically make smaller demands upon the total economy of a city over 2,000,000 than they do in cities of smaller populations.

The overall impression which is gained from the data in Tables 1 and 2 suggests that typically the course of metropolitan

[17] Among the service industries, only Personal Services continues its decline. This occurred only because the sub-division Private Households employment declined. The percentage of total metropolitan employment in private households is clearly affected by geographic location, being much higher in southern cities than elsewhere. Since there were no southern cities included in the group of cities above 2,000,000, we feel the geographic factor in this case obscures such effect as population size may have on the percentage of total employment in private households.

[18] The same pattern also holds for construction. However, as noted earlier, this industry is tied to the rate of population growth. The differentials reflect this. It may be true that rate of growth can be derived from the absolute population size. But we do not feel this is established and prefer to assume it is another independent variable which is particularly significant to construction. Such relationship as population size may have directly with the percentage of total employment in construction is, therefore, ignored.

TABLE 2
PERCENTAGE OF TOTAL METROPOLITAN EMPLOYMENT BY TYPE OF INDUSTRIAL CATEGORY FOR THREE METROPOLITAN SIZE GROUPS (AVERAGES)

Type of Industrial Category	Metropolitan Size Groups				
	City Group I	Difference (II-I)	City Group II	Difference (III-II)	City Group III
Manufacturing	26.33%	+7.00%	33.33%	+0.42%	33.75%
Nonmanufacturing	73.67	—7.03	66.64	—0.38	66.26
Total	100.00		99.97*		100.01*
Durable Mfg.	15.38%	+3.89%	19.27%	+1.26%	20.53%
Nondurable Mfg.	10.95	+3.11	14.06	—0.84	13.22
Transportation & Communication	8.30	+0.29	8.59	—1.18	7.41
Utilities	1.63	+0.04	1.67	—0.12	1.55
Trade	23.25	—1.23	22.02	—0.79	21.23
Finance & Business Services	7.51	—0.46	7.05	—0.93	7.98
Personal Services	7.59	—1.25	6.34	—0.22	6.12
Professional Services	10.61	—0.82	9.97	+0.72	10.51
Public Administration	6.71	—2.32	4.39	+0.45	4.84
Mining	0.87	—0.48	0.30	+0.24	0.63
Construction	7.20	—0.81	6.39	—0.40	5.99
Total	100.00		99.97*		100.01*

*Totals deviate from 100 per cent due to rounding errors.

economic development involves not simply a change of the industrial structure of the metropolis—a point which is generally understood—but that changes in structure are interrupted by kinks and discontinuity of trends. Structural changes of a particular kind often will not continue in the same direction throughout the growth span of a metropolis. Such changes may simply halt or they may possibly alter direction. The characteristic of specialization, as it is used to describe city groups of a particular population range can be applied in terms of employment concentration in a few high employment industries or in terms of particular types of industrial categories. In neither application does it show a consistent, simple (direct or inverse) relationship to city size over the whole range of metropolitan development. It is also apparent from our analysis that one critical population range for these discontinuities in development occurs from about 750,000 to 2,000,000. To this point, at least, it would appear that the process of metropolitan growth may be rather more complex than previously thought.

VARIATION WITHIN CITY SIZE GROUPS

While we have been able to find that certain structural changes in the metropolitan economy are associated with differences in metropolitan size, use of some measure of the variability within each group about its average will give us a bet-

ter picture of what pattern may develop within a group of cities as it reaches a particular range of population. To this end Tables 3 and 4 present the 12th and 88th percentiles for each of the employment rank and type of industrial groups included in Tables 1 and 2.[19] For a value to fall outside either one of these limits would likely represent a substantial divergence from the values typical of the group.[20] Such a divergence would likely be the result of a circumstance peculiar to the community involved and would in most instances be sufficiently out of the ordinary to be readily discerned by an analysis of that community. What we are attempting with these figures is to define the limiting conditions which would ordinarily pertain where no such obvious factors for divergence are at work.

With this objective in mind, Table 3 is seen to offer some indication of the extent of variability of employment distribution among industries in the cities of each of the population size groups. The 88th-12th percentile range is smaller in each instance for the cities within the intermediate size category.[21] This is particularly apparent in the case of the 5 industries of largest employment, but is also clear in the case of each of the other two industry-employment groups. This indicates a higher degree of homogeniety in terms of employment distribution among cities within the 750,000-2,000,000 range than for those in either the smaller or the larger size brackets.

From Table 3 two other behavioral attributes of the metropolitan growth process may be noted. It shows that the 88th-12th percentile ranges for the top 5 industries in city size groups I and II are almost mutually exclusive. The maximum limit for group II cities is almost identical with the minimum limit of the range for group I cities. Table 1, it will be recalled, shows that the average for the 5 industries of highest employment is also less for group II cities than for group I cities. We may infer from these figures that, as a group, it is quite unlikely that industries of the highest employment category (whatever actual industries this may involve) in a city in the 500,000-750,000 population range will demonstrate growth in proportion to that exhibited by total employment of the city if that city's population increases to the 750,000-2,000,000 range. As a group, industries in this employment category cannot be considered likely to act as growth stimuli for cities in the size I population range. There may, of course, be individual industries which are exceptions to this generalization. The significance of these exceptions will be discussed at greater length later. At this point we merely note that they are less important in the changes between the group I and II cities than between the group II and III cities.

SOURCES OF GROWTH

At the other extreme of the employment scale, the 88th-12th percentile ranges for the 10 industries of lowest employment in city size groups I and II are mutually exclusive with the minimum

[19] These percentiles are approximate since the numbers of cities in each group do not have a common division. The actual percentiles were as follows: group I cities: 86.7%-13.3%; group 11 cities: 88.9%-11.1%; group III cities; 87.5%-12.5%.

[20] The 88th and 12th percentiles are used rather than the full range of values on the assumption that the extreme values may distort the picture by including those cities that are being influenced by extraordinary conditions. The approach here follows Morrissett (**op. cit.**) and Alexanderson (**op. cit.**) modifying these through the use of the dual classification of industries as a means of underscoring the major trends in metropolitan economic development.

[21] Standard deviations were computed for each of these industrial employment categories with substantially the same results as indicated by Table 2.

limit of that range for group II cities exceeding the maximum limit for the range in group I cities. The averages from Table 1, of course, also show an increase. Hence, by reasoning paralleling that of the preceding paragraph, we conclude that, as a group, the 10 industries of lowest employment in a city of 500,000-750,000 are quite likely to grow proportionately more than the total economy and employment of such a city as it expands to the 750,000-2,000,000 population class. It seems prob-

TABLE 3
88TH-12TH PERCENTILE RANGES OF INDUSTRIAL EMPLOYMENT RANKS FOR THREE METROPOLITAN SIZE GROUPS

Industrial Employment Rank in the Metropolitan Economy	Metropolitan Size Groups					
	I		II		III	
	88th-12%	Range	88th-12th%	Range	88th-12th%	Range
5 Industries of Highest Employment (Excluding Construction)	44.38-34.35	10.03	34.49-30.16	4.33	40.10-29.08	11.02
Next 21 Industries In Size of Employment	53.44-45.01	8.43	56.69-50.99	5.70	56.93-48.88	8.05
10 Industries of Lowest Employment	6.81- 3.96	2.85	9.02- 6.86	2.16	8.76- 5.45	3.31

TABLE 4
88TH-12TH PERCENTILE RANGES FOR TYPES OF INDUSTRIAL CATEGORIES IN THE THREE METROPOLITAN SIZE GROUPS

Type of Industrial Category	Metropolitan Size Groups					
	I		II		III	
	88th-12th%	Range	88th-12th%	Range	88th-12th%	Range
Mfg. (total)	34.17-16.06	18.11	41.63-24.97	16.66	38.89-25.92	12.97
Nonmfg. (total)	83.94-65.83	18.11	75.03-58.37	16.66	74.07-61.11	12.97
Durable Mfg.	20.80- 6.07	14.73	29.11-10.91	18.20	32.33-11.87	20.46
Nondurable Mfg.	13.63- 5.98	7.65	15.54-12.63	2.91	19.36- 6.56	12.80
Transportation & Communication	9.83- 5.85	3.98	9.80- 7.14	2.66	9.04- 5.87	3.17
Utilities	1.94- 1.33	0.61	1.89- 1.54	0.35	1.66- 1.41	0.25
Trade	26.03-19.25	6.78	25.01-19.73	5.28	23.62-19.14	4.48
Finance & Business Services	8.85- 5.41	3.44	8.43- 6.24	2.19	9.79- 5.79	4.00
Personal Services	10.03- 4.72	5.31	7.76- 4.73	3.03	7.16- 4.88	2.28
Professional Services	12.68- 8.68	4.00	9.88- 9.08	0.80	12.71- 8.91	3.80
Public Administration	10.13- 4.15	5.98	5.16- 3.72	1.44	6.10- 3.34	2.76
Mining	0.83- 0.08	0.75	0.45- 0.07	0.38	0.61- 0.08	0.53
Construction	8.90- 5.64	3.26	7.30- 5.19	2.11	7.35- 4.91	2.44

able that these industries are at least one of the sources of metropolitan growth between these two size ranges. For this reason these small industries probably merit closer attention in the analysis of a city's economy than their employment rank would otherwise merit.

The significance of these conclusions can be sharpened by removing from the two employment groups those industries which are known to behave in a fashion contrary to the trends of the group. As an illustration, consider mining. This industry displays, if any trend at all, a declining role in importance as the population range of cities is increased from size I to II. While not entirely insensitive to changes in population, as is sometimes thought, its potential growth and limitations to its size are clearly subject to factors not associated with the immediate metropolitan population. Typically employment in mining puts it among the 10 industries of lowest employment in the metropolis. Thus, when we remove this industry from the lowest 10, the growth of that group, which is evident in the averages and the 88th-12th percentile ranges, is known to be accounted for by the remaining 9 industries. Elimination of industries such as mining narrows the group and reduces the number of industries from which above average growth may be expected.

Table 4 gives some further evidence of the industrial sectors in which changes in metropolitan structure are taking place. As a guide to determining which industries display disproportionate growth (whether it be high or low), this table is somewhat less informative than Table 3, notwithstanding the fact that it identified specific types of industrial groups. Nevertheless, when interpreted in the light of the information from Table 2 showing the averages for these same industrial categories, Table 4 gives additional insight about the nature of the metropolitan structure and functions at different population levels.

The largest cities (those above 2 million) show the smallest ranges of variations in the two broad divisions of the economy, manufacturing and nonmanufacturing. On a basis of this very broad division, cities of the largest size category are the most nearly similar. The more detailed figures of Table 4, showing the 11 industrial categories, however, indicate differences at this level are smaller among the group II cities than among the largest cities in 9 of 11 cases. The intermediate sized cities also demonstrate smaller variations among themselves than do the group I cities in 10 of the 11 categories.[22] On this more detailed level, therefore, cities in the 750,000-2,000,000 population range certainly give the appearance of greater similarity of structure than do either of the other two metropolitan size groups. This finding coincides with the conclusions we reached concerning homogeniety as measured by differences in the distribution of employment by industries ranked in terms of employment.

Divergence of these two indicators of the degree of similarity among cities in the same population range provides another dimension for the analysis of the metropolitan economy and reflects again

[22] Totalling the deviations for the 11 categories of industries shows the following result: I=56.29; II=39.35; III=56.97. Other statistical measures confirm the greater homogenity of group II cities at this level of classification. The standard deviations for these 11 industrial categories is smaller in 8 instances. The range is smallest in 9 of 11 categories. Moreover, in analyzing the 37 separate industries, group II cities show the smallest range in 20 categories while group III cities have the smallest ranges in 14 and group I cities the smallest in 3. The total spread of the ranges is almost 30 per cent less for group II cities than the city group (III) with the next smallest spread.

the complexity of metropolitan growth processes. The association between degree of similarity of cities and city size depends upon the level at which measurement is taken. This may be seen more clearly by a closer look at the manufacturing sector.

Cities of group III demonstrate rather small differences in terms of total manufacturing, as noted above. They show relatively little specialization among themselves as regards manufacturing or nonmanufacturing. The proportions are close to the same for all these metropolises. However, the differences in both the manufacturing subcategories are comparatively large, exceeding the differences in these categories for both the group I and group II cities. This means that cities above 2,000,000 specialize among themselves as between durables and nondurables manufacturing to a degree substantially greater than either of the other two city size groups. The fact that the differential in durables is so much larger than the differential in total manufacturing means that the difference must be made up by an adverse variation in nondurables. The same situation prevails in the nonmanufacturing sectors of these economies.

There may be reasons for wishing to measure the degree of similarity of cities by gross divisions such as manufacturing and nonmanufacturing activities and for this reason it cannot be said that the conclusions from the more detailed classification is correct while that from the broader divisions are wrong. But for most purposes, we believe that the more detailed picture is more satisfactory and in this sense the conclusions regarding homogeniety of the size groups is more meaningful when stated in these terms. And in these terms the cities in the 750,000-2,000,000 population range display a markedly greater degree of similarity than do those of the other two size groups. This was also true in terms of employment distribution.

A final point should be made in connection with Tables 3 and 4. As just noted, cities above 2,000,000 give evidence of increasing specialization among themselves even though this does not manifest itself in the division between manufacturing and nonmanufacturing activities. Thus, for example, Los Angeles is higher and Chicago is lower in the percentage of total employment in the professional service category than any city in group II. Similarly, Philadelphia is higher and Pittsburgh is lower than any city in group II in the manufacture of nondurables.

GROWTH ECCENTRICITIES

All this means that when we attempt to set limits for the "typical" growth of metropolitan areas, the narrowing differences among cities of the same size group and, correspondingly, the narrowing range of likely error in anticipating the specific shape of cities which characterize the change from group I to group II cities continues beyond the 2,000,000 population level only in so far as the division between manufacturing and nonmanufacturing is concerned. The significance of what is designated as "typical" is somewhat reduced.

Moreover, since specialization in those industries which are geographically sporadic in their location is more pronounced in the largest cities than in the group II cities, the limits of the 88th-12th percentile range are more apt to eliminate some of the salient features of individual metropolitan areas of the cities above 2,000,000. The data in this form (88th-12th percentiles) are not well suited to the task of anticipating metropolitan

eccentricities and this is, in effect, what a decided degree of specializaton in a locationally sporadic industry constitutes. The determination of what specialities develop in individual cities must, for this reason, be left to the economics of location.

The 88th-12th percentile ranges, however, do offer some guidelines as to what the nature of the metropolis will be as regards the remaining sectors of its economy. Since a high degree of specialization in the locationally irregular or sporadic industries seldom exceeds three or four industries of the 37, the 88th-12th percentile range remains a useful device for sketching the largest part of the structure which typifies the economies of these largest cities just as it does for smaller cities. It should be borne in mind, however, that at best these statistical descriptions offer only a point of departure for the analysis of individual cities.

SUMMARY

The overall picture of metropolitan areas as we see it is this: the cities of 500,000-750,000 population are specialized centers. This specialization is usually in nonmanufacturing activities. Trade, services, and public administration are a larger part of the economies of most of these cities than they are of the larger metropolitan areas. Most of the 10 industries of lowest employment in these cities (an average of 7.33) are from the manufacturing categories. A few cities in this size range do specialize in manufacturing. When they do so it is confined to relatively few fields of manufacturing. Providence, Rhode Island and Youngstown, Ohio, are, perhaps, the prime examples of this. This specialization within a narrow industrial category is also a characteristic, though to a lesser extent, in the nonmanufacturing activities. This is evident from the wide 88th-12th percentile ranges of the 11 industrial categories found in Table 4. We feel that such industrial specialization by the metropolitan areas of this size range is almost inevitable since it would be difficult to cover a broad spectrum of economic activity without greater local resources than are at the disposal of a city of this size.

The cities between 750,000-2,000,000 population are markedly different from those of the small size group. By way of averages, they show a markedly higher orientation toward manufacturing. Yet manufacturing never reaches the degree of importance to the local economy in these cities that it does in a few of the smaller cities. The gaps of the smaller cities are filled in. Since these gaps are dominantly in manufacturing, it is this activity which shows the greatest increase between the two groups. However, as a group, the 10 industries of lowest employment (whatever their nature) are a greater proportion of the total economy of cities of this size on the average. Inequality in the distribution of employment among industries is lessened. This is another way of saying that diversity of activity is increased. Moreover, within this group there is comparatively little specialization of functions. Uniformity is one of the distinct characteristics of these cities.

As between manufacturing and nonmanufacturing activity the cities above 2,000,000 show the greatest stability but within these two broad divisions they specialize, in some cases almost as severely as the cities of 500,000-750,000. On the other hand, the averages for these cities depict a structure which is certainly more proximate to the cities between 750,000-2,000,000 population. Thus, the largest cities, as a group, are, in

important ways, somewhat like both the two smaller size groups.

When we consider these three groups of cities side by side we see that structural changes in one direction which exist between one pair of city size groups commonly disappear or alter course between the other pair of city size groups. That these developments take place within the range of population encompassing the intermediate sized metropolitan areas, indicates that population range constitutes, for a substantial number of metropolitan functions, either a point of decline or increase. Adjustments in city structure below this population range as the metropolis grows presumably are in response to a demand for functions which can be fulfilled by cities in the 750,000-2,000,000 range with their characteristic mix of industries. Seemingly these demands are satiated by the proportions of industry found in the cities of this size. However, above 2,000,000 population, the metropolis has the potentiality for carrying out new functions. The demand for these begins to affect the structure of the metropolitan economy and along with the relative decline in the importance of some of its older functions the metropolis growing above the 2,000,000 level is remolded once again.

We are able to see these changes in the course of structural adjustment only in the intermediate sized cities because we have only three population ranges. This is the only place they could appear in our statistical picture. It is quite possible that if the number of population ranges under analysis were increased to include cities of smaller populations, other changes in the trends of metropolitan structural adjustment might be detected in other population ranges. We feel that the 750,000-2,000,000 range of population has been shown to be one which merits considerable study because within this range, changes in the functions of the metropolis seem to be prevalent. But other population ranges may be equally significant in this particular. What is most important is the recognition that functional adjustments do transpire in the course of metropolitan growth and alter the path of development of the city. This is important because changes in these functions alter the problems which arise as the city grows and planning to meet these problems must accordingly be adjusted.

The Use of Management Consultants

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More than 1,800 firms in the United States do some kind of business consulting on a full-time basis. Perhaps 1,000 of these firms are broadly enough organized to provide services in more than one functional area of management and hence may be considered to be management consultants in the full sense of the word. The total dollar volume of fees earned by such firms is well over $200 million a year.

The fact that consulting services are offered and utilized on such a scale means that a great many businessmen have found real value in the use of this kind of professional assistance. The alert manager will want to know more about it, so that he can make the best decisions on when, where and how his company might use management consultants.

WHAT IS MANAGEMENT CONSULTING?

Essentially, management consulting is an organized effort by specially-trained and experienced persons to help management solve problems and improve operations, through the application of objective judgment based on sound management principles and systematic analysis of facts.

Consultants bring to the problem-solving process certain distinct advantages that are not otherwise readily obtained. Impartiality is one such advantage; there is no substitute for the independent view. Broad experience is another; while every client situation is in most respects unique, none is completely without precedent to the experienced consultant. Analytical skill is a third advantage; it is the consultant's business to know how to select and interpret information meaningfully. Finally, consultants can devote their full-time attention to the problem at hand. Undistracted by day-to-day operating responsibilities, they can carry a client project through to completion thoroughly and expeditiously.

The management consultant today is much more than an "efficiency expert." While the profession may have originated in the time-and-motion-study approach to production, today its typical role is that of aiding top management in the solution of top management problems—problems which affect the fundamental vitality of the entire enterprise. The tools of the

trade, so to speak, have shifted from the stop watch and clip board to the organization chart and the electronic computer.

Concurrently, the consultant's practice has become both more generalized and more specialized. With the accelerated advances in technology and communications in the past quarter century, businesses and other institutions have greatly expanded the scope and diversity of their operations. The burdens of administration have increased correspondingly, and so has management's need for outside assistance in the analysis and solution of company-wide problems in planning, organization and control.

At the same time, the techniques of management have become infinitely more sophisticated and complex. Every operational area, such as marketing, finance and production, has developed a management science of its own. If a company is to maintain its competitive position, it must have access to a vast amount of specialized knowledge and skill. Here again, the management consultant has come to the fore, as a technical adjunct to the management team.

WHO USES CONSULTANTS, AND WHY?

Business organizations of all kinds—commercial, industrial and service—have typically been the most frequent users of management consulting services. However, not-for-profit institutions, such as colleges and universities, public and private schools, and hospitals and health agencies, are also more and more regularly turning to professional management counsel, and so are federal, state and local government agencies.

Nor is the use of management consultants limited to organizations of large size. While large organizations were the earliest to recognize the advantages inherent in outside counsel, an increasing number of medium-sized and smaller enterprises are availing themselves of this aid.

Location is no barrier, either. Management consultants are serving companies, institutions and governments all over the free world. Many firms are establishing branch operations abroad to meet this increasing demand.

Contrary to popular assumption, management consultants are not exclusively, or even largely, "doctors to sick businesses." It is safe to say that the majority of management consulting clients are well-managed, successful organizations. Their problems are the normal consequences of growth and change: they need a new plant in a new location, for example, or a revised organization structure to accommodate a recent acquisition.

WHEN SHOULD CONSULTANTS BE USED

Generally speaking, a company may find it advisable to employ the services of a management consulting firm either when known problems exist, the solutions to which require time and talents that are not readily available within the company, or when management suspects that problems exist (or wishes to assure itself that they do not exist) and believes that the true state of affairs can be ascertained only through a complete and objective examination by men who know what to look for and who can take a broader view than those who are preoccupied with the details of day-to-day operations.

Sometimes the need for help is indicated by the simple fact that management has tried and failed to solve a particular problem. Other circumstances which often suggest the need for outside help are: unfamiliarity with the problem,

a desire for fresh ideas or new techniques, or a conflict of views within the company.

There is a growing tendency to call on consultants periodically for a general management audit. This practice, performed on a regular schedule, enables management to spot potential problems in their early stages and thereby to take corrective action before serious consequences develop.

Similar to the management audit is the use of consultants in a general review of operations at a time of top management change. Here the principal aim is to appraise the strengths and weaknesses of the enterprise as a basis for planning steps toward future growth.

Consultants are also frequently called in if there has been a significant increase in an organization's size. Major problems in financing, executive staffing and organizational arrangements inevitably crop up as a company breaks the size barrier between small and medium, or between medium and large.

However, management consultants are basically problem solvers. Therefore, in the main, their use is indicated whenever problems arise which management itself is not fully equipped to solve. Often such problems are traceable to inadequacies in fundamental company policies, problems which are especially difficult for operating management to detect. Yet these are the most important problems of all, since they are basic to the enterprise and directly concern its survival.

Top management problems of this kind concern the objectives of the enterprise; the extent to which these objectives are being met; the basic policies of the organization and the effectiveness of its control devices; the effectiveness of the over-all organization, including such questions as the extent to which decentralization should prevail; decisions concerning acquisitions and mergers; long-range plans for the development of the enterprise; and even the effectiveness of the management team.

Financial problems, also, are frequently indicators of the need for consulting assistance. These problems may involve the operation of the budget and of the accounting system; the effectiveness of the cost control system; the feasibility of mechanizing the financial processes, including the possible use of electronic computers; the adequacy of the financial reports as a basis for operating decisions; and the general fiscal policies of the enterprise.

Personnel problems are often of major concern, since the whole field of human relations is still one of the most complex factors affecting the operation of any enterprise. The problems here may involve the personnel policies of the enterprise; the adequacy of the fringe benefits; the selection and training of employees; the operation of an executive development program; the adequacy of salary levels for specific classes of employees; and the development of incentive systems for securing more favorable employee relations and improved output.

The adequacy of future planning often raises sufficient questions at the top management level to warrant enlisting the aid of professional consultants. Planning problems may be very complex, involving the future of the entire enterprise; the diversification of its product line; the marketing techniques employed; the sales analysis; or even problems concerning the production facilities of the enterprise.

This is just a sampling of the many problems which may indicate the need for consulting assistance. The indications of trouble may be complex and obscure, or they may be such directly measurable

factors as declining sales and profit percentages. Other trouble indicators might be rapid increase in selling cost; overburdened executives or supervisors; high turnover of personnel; inabilty to meet delivery schedules; quality complaints; loss of position with large accounts; loss of position in major product lines; excessive, slow-moving or obsolete inventories; too much paper work; lack of current information upon which to base operating decisions; or excessive use of committees for decisions.

WHAT IS THE BEST WAY TO SELECT CONSULTANTS

The best assurance that a management consulting engagement will produce satisfactory results lies, primarily, in the care with which the consulting firm is selected. As pointed out, there is wide diversity within the consulting profession, ranging from a one-man specialist to firms of over 200 men providing general services. Some firms have more talent and experience in dealing wtih one aspect of management than another. And, as is true in every profession, some firms are more scrupulous in their standards of practice than others.

The crux of the matter is to select the firm that is best qualified to meet the particular requirements of the assignment in question, and this calls for painstaking investigation.

References from other companies that have used or are using the services of consulting firms can be a useful guide in making the choice. Most firms are glad to supply the names of several client companies who can be queried directly. Also, it is nearly universal practice among reputable consulting firms to supply a good deal of information about the scope and nature of assignments on which they have worked, and this is particularly useful in judging their suitabilty for a contemplated project.

Banks, law firms, public accountants and advertising agencies can also be relied upon to make unbiased recommendations. Such sources are likely to be objective, because a recommendation carries responsibility.

Standard investigating agencies, such as the Better Business Bureau, Dun & Bradstreet and credit associations, always should be checked. In particular, the bank used by a consulting firm should be among its best references.

Where feasible, there is much to be gained by visiting the offices of the consulting firm under consideration, to meet its principals and to gain an impression of the kind of organization it is.

It may not be possible or necessary to follow up all investigation leads, but it is wise at least to get definite answers to the following questions:

—How long has the firm been in business?
—What is the background of the principals of the firm?
—What kinds of clients has it served?
—What do clients say about its work?
—How much of its business is "repeat" business?
—How much time will principals of the firm spend on the assignment in question?
—Has the firm had experience that is applicable to the problem at hand?
—Does the firm provide in advance an estimate of fees for its services?
—Is it the practice of the firm to make a written proposal of study, clearly defining the objectives of the assignment and the work to be done?
—Are the estimated charges for the assignment reasonable, considering the difficulty of the problem and the time required to solve it?

One thing to beware of is claims of guaranteed results. A management consultant can no more guarantee to solve

a problem than a lawyer can guarantee to win a case, and no reputable firm will resort to such promotional tactics.

HOW CAN SUCCESSFUL RESULTS BE ENSURED?

Successful consulting engagements are always cooperative ventures. The consultant, on his part, can be counted on to do his best to bring the engagement to a successful conclusion; his reputation is at stake. But it is also essential that the management of the client organization enter into an engagement in the spirit of really wanting it to turn out successfully, and that this spirit be communicated to everyone involved.

Where feasible, advance discussions should be held with all key individuals concerned to reach consensus that there is a problem to be solved and to make it clear that the consultant is being employed for a definite and constructive purpose. This encourages cooperation with the consultant and saves time and expense by enabling him to get off to a fast start. A thorough briefing of the consultant, with full disclosure of all pertinent information about the problem, especially regarding the personalities involved, will also reduce start-up time and expense.

One individual or group in the client organization should be designated to work closely with the consultant. This generates mutual understanding of the steps to be taken throughout the progress of the assignment and, by affording an opportunity for discussing tentative conclusions, ensures that final recommendations will be realistic and practical.

HOW CAN THE RESULTS BE MEASURED?

The results of management consulting engagements often can be readily evaluated. Tangible savings may be immediately evident, for example, or a troublesome problem may have been clearly alleviated. Sometimes, however, where changing company policies or organizational revisions are concerned, the results may be measurable only after a considerable lapse of time, and then, perhaps, only as one of many contributions to a company's progress.

Tangible or intangible as the results may be, the client should be able to arrive at a prompt and realistic appraisal of the quality of counsel it has received answering the following questions.

—Has management received a stimulus to its own thinking?
—Are the recommendations practical and will they be implemented?
—Were the original cost estimates for the assignment realistic?

In the final analysis, the best measure is management's judgment of whether it would be willing to employ the same consulting firm again. The fact is that about three out of four management consulting engagements result from the direct recommendation of a previous client—one who has used the services of a firm not once but repeatedly. And this, after all, is the strongest evidence that performance has been effective.

Forests in the Economy of the Missouri Eastern Ozarks

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The traveler driving south from St. Louis on U. S. highway 67 soon leaves the fringe of urban development along the highway. Motels, service stations and drive-in refreshment stands give way to a predominantly wooded countryside. Farms are not as numerous as farther to the north and west. The same is true when one leaves Salem driving south on state highway 19. These are entries to the Eastern Ozark Region of Missouri, Fig. 1. The region extends from the high broad ridge of land connecting St. Louis and Rolla south to the Arkansas state line. The two highways roughly define its east-west extent, although the actual boundaries extend somewhat further east and west. The region may be conveniently defined as one which follows the exterior boundaries of a group of 14 counties. It excludes surrounding areas that are similar, but within, the region is quite homogeneous in many respects—topography, climate, people, their culture, agriculture, and industries.

REGIONAL CHARACTERISTICS

Topographically it is perhaps the roughest area in the state. There are relatively few broad valleys; most of the area consists of heavily wooded slopes and narrow hollows. Several of the most scenic rivers, of national reputation for fishing and float trips, are found here. The spectacular springs—Montauk, Round, and Big Spring—located in state parks attract increasing numbers of campers, tourists, and picnickers each year.

The rough topography affects farming practices.[1] Cultivation is confined principally to valley bottoms and broader ridges although in the more gently rolling sections a larger proportion of the land is in field crops. Steep hillsides in some cases have been cleared for pasture, but for the most part they have remained in forest cover. Generally the soils are less fertile than in other parts of the state.

The region was described by the U. S. Department of Agriculture in its publication *Development of Agriculture's Human Resources* (1955) as being one of the serious problem areas in the United

[1] Cole, A. B. and R. C. Smith. **The Forest Resources of Rural Householders in Dent County, Missouri.** Mo. Ag. Expt. Sta. Res. Bul. 740, June 1960.

Fig. 1—Location of the Eastern Ozarks in Missouri.

States. More than 50 per cent of the commercial farms had a gross income of less than $2,500 annually, and the level-of-living index was among the lowest one-fifth in the nation. Of all rural families, 29 per cent had incomes from all sources of less than $1,000 in 1955. The small size of farm businesses contributed in large measure to this situation. Compared to the rest of Missouri, the economic resources are low. Levels of education, living and use of farm machinery are below those reported for other regions in the state. Roads are of lower quality and the value of land and buildings is lower than in other areas.

YOUNG PEOPLE MOVE AWAY

An appraisal of the region from statistical data can be somewhat misleading. There are productive, well-managed farms and the production of livestock is flourishing. Towns are prospering with new businesses and new residential additions can be seen in many communities. Enterprising towns have branch plants of industrial firms that make shoes and clothing. Smaller firms make fabricated metal and wood products. The mining industry, long established in the lead belt in the eastern counties, is enjoying an exciting boom of exploration and devel-

opment for the production of iron, lead and barium.

The preliminary report for the 1960 census of population shows that 117,461 persons live in this 14-county area, accounting for 4 per cent of the population of Missouri. Nine counties have a population of less than 10,000 (one has 3,906) and the highest county population is 36,000. The population is largely a rural one. Only 15 towns have a population in excess of 1,000 and only two, Flat River and Poplar Bluff, have more than 5,000 people. In these 15 towns there is a total of 51,480 people and the rest, 72 per cent of the people, live in villages and in the country. The area has been characterized by a surplus population above that required to maintain stable levels of income and employment, but people are leaving the region, especially young people. Between 1950 and 1960, 9 per cent of the total population left the area while Missouri population as a whole increased 8.6 per cent during the decade. The migration was to large cities. Within the region there was a slight movement to towns. Seven towns grew in population but 8 became smaller. By way of gross comparison, Missouri has 62 persons per square mile of land area. The Eastern Ozarks has 18.5 persons per square mile. The large population in relation to resources may be correcting itself but the trend of migration periodically reverses as economic recessions reduce employment in St. Louis and other large cities.

DEPENDENCE UPON FORESTS

Many residents of the area are former timber workers or descendants of timber workers who settled the region during the time of logging the heavy stands of timber. Following the logging boom, they remained on the land and attempted to farm. A long persistence of a sort of frontier way-of-life followed, caused by the meagerness of natural resources and, to some extent, isolation. The rapid exhaustion of resources forced people to shift occupations or combine several activities. After decades of economic gloom, agriculture and forestry show promise of reaching positions of permanent productivity. The concept of conservation or sound management of natural resources is finding increasing acceptance. Manufacturing, mining and recreation, the newest activities to achieve significance, may be additional keys to future prosperity.[2]

Heavily forested regions support a variety of industries which use wood as a raw material. The products manufactured are to a large degree determined by the three species available. In addition to labor, power, water and other requirements, the size of industries and their organizations are influenced by the nature of the forest resource: size of trees, volume available per unit area, and total volume that can be acquired by an industry. Quality of wood material is influenced by forest management practices such as effective protection against fire and insects, and cutting practices which continue to increase the proportion of high-quality trees. A forest is an unusual resource. If managed properly, it can be an inexhaustible source of raw material, simply because trees grow. A forest organized as a business enterprise is a combined factory, inventory and product. The forests of different regions vary markedly both in their nature and the extent to which they can furnish wood for industrial processing.

In Missouri at the turn of the century, the original timber stands were logged

[2] Kersten, E. W. Jr., "Changing Economy and Landscape in a Missouri Ozark Area." **Annals of the American Assoc. of Geographers,** 48 (4); 398-418, December 1958.

with little thought of growing future tree crops. Timber as a raw material was approaching the point of exhaustion by 1930. The large sawmills had moved to the South or West and the manufacturers of wood products had closed their plants or were operating on a limited basis. The initiation of organized forest fire protection by the Missouri Conservation Commission and acquisition and rehabilitation of 1.3 million acres of forest land by the U. S. Forest Service demonstrated that timber growing is possible. A source of technical forestry aid to landowners was provided by the farm forester program. Although there is still opportunity for major improvement, the forest resource has been rebuilt to the point where increasing harvests of timber are possible. New and expanded wood-using industries have been established which show promise of substantially boosting the economy of the region.

TIMBER RESOURCES[3]

Land Area

In these counties forests grow on almost three-fourths of the total land area of 6,149,000 acres (9,609 square miles). Other use of land such as farming, and town and road locations occupy 1,757,000 acres or 28.6 per cent of the land area. Of the 4,392,800 acres of forest land, 60,000 acres or 1.4 per cent are included in parks and land of extremely low productivity. The remaining 94.6 per cent of the forest land or 70.5 per cent of the region can be regarded as commercial forest land, capable of growing crops of trees.

Since World War II, clearing of forest land for crops, pasture, home and commercial sites, and new roads has reduced the forested area by 100,000 acres. More land was actually cleared but the gross cleared area was partially offset by the abandonment of fields and pasture which reverted to tree cover.

All of the 14 counties in the region are more than 50 per cent forested, Bollinger, Butler and St. Francois, located along the east side of the region, are 52 to 55 per cent forested. At the other extreme, Carter, Reynolds, Shannon and Wayne are 80 to 85 per cent forested and five other counties have 70 to 80 per cent of the land area in timber. It is the most heavily timbered region of Missouri.

Ownership

Three-fourths of the commercial forest land, 3,297,100 acres, is in private ownership—individuals and business firms. One-half of the private land is owned by farmers, 8 per cent is controlled by industries that use wood as a raw material or sell timber, and 42 per cent is owned by business men, professional men, heirs of estates and many other people. A lack of interest in timber and the absence of sound forestry practices on private land remains evident. In fact, a study by Farrell[4] in this region indicated that 75 per cent of small forest owners intended no use of their forest land which would result in timber production. Only 9 per cent of the owners practiced forestry but they held 40 per cent of the forest land in the area studied. Some of the best managed timberlands are in small private ownerships and industry-owned tracts in this region.

The public holds a substantial interest in the commercial forest land too. Four per cent is owned by the state and mu-

[3] Preliminary data, 1959 forest survey, Univ. of Mo. Ag. Expt. Sta., Central States Forest Expt. Sta. and Lake States Forest Expt. Sta. cooperating.

[4] Farrell, J. H., "Economics of Timber Production on Small Forests in the Missouri Ozarks," unpublished manuscript. Central States Forest Expt. Sta., U. S. Forest Service.

nicipal governments, mostly in state forests. The federal government owns 22 per cent of the forest land, most of which is administered by the Forest Service, U. S. Department of Agriculture, in the Clark and Shawnee National Forests.

Timber Stand-size

To be in the best possible condition to provide continuous yields, the area of a forest should be, roughly, one-third sawtimber, that is, trees over 11 inches in diameter at 4.5 feet above ground. They are merchantable for the more valuable products such as lumber, barrel staves, and furniture veneer. Another one-third of the area should be in pole-sized timber, trees 5 to 10 inches in diameter. These trees are still growing rapidly but are saleable for making paper pulp, charcoal or wood fuel if markets for these products are present. The remaining one-third should be occupied by seedlings and saplings. The trees of the latter two size classes grow to larger sizes as sawtimber is harvested and small trees are reproduced to keep the cycle going.

The Eastern Ozark Region is rapidly recovering from generations of abuse and unplanned harvest of timber. Twenty-eight per cent of the tree stands are sawtimber, 39 per cent are poletimber and 14 per cent are seedlings and saplings (Figure 2). It is discouraging to note that almost 20 per cent of the forest area is poorly stocked or nonstocked.

The success of past forestry practice is attested by the fact that public agencies which control less than one-fourth of the land hold one-third of the sawtimber. Farmers own another one-third and the remainder is owned by other owners. More than three-fourths of the poorly stocked and nonstocked areas are in private ownership.

During the past 12 years, between successive state-wide timber inventories,

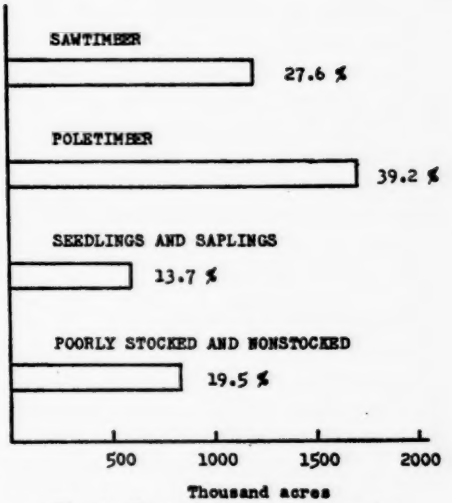

Fig. 2—Commercial Forest Area by Stand-Size Class.

the inadequacy of stand-size distribution has lessened. The area of sawtimber stands nearly doubled. Poletimber stands and those of smaller size were reduced by more than 630,000 acres, largely due to growth which moved them into sawtimber size. Thus it appears that the growing stock will approach a reasonably desirable tree-size distribution within the next few decades. The most serious problem is that of reducing the 840,000 acres of poorly stocked young stands and nonstocked areas.

The most prevalent forest type, described by tree species composition, is the oak type. Dominated by seven species of oak it occupies more than three-fourths (3,200,000 acres) of the forest area. Black oak and scarlet oak occupy more than one-half the forest area. Areas occupied by shortleaf pine more than doubled in 12 years and now occupy 5.5 per cent of the total area. Mixed stands of oak and pine on 130,000 acres were converted to pine by the natural aggressiveness of pine and owners' efforts to encourage the conversion. Although the

total area is still small, the change is important because of the rapid growth characteristics of pine and the fact that it can be sold at a young age for posts and poles. This makes repeated thinnings in young stands possible which hasten the development of large, more valuable sawtimber. Important to the forest owner is the fact that thinnings are a source of immediate profit.

Timber volume

Table 1 shows that the total inventory of sawtimber is almost 3.3 billion board feet. (A board foot is a piece of wood 12 by 12 inches, 1 inch thick). Black oak is the leading species with 708 million board feet, 21.5 per cent of the total volume. White oak with 577 million feet comprises 17.5 per cent and post oak and scarlet oak are both over 300 million feet. Shortleaf pine ranks third in sawtimber volume. Black oak, white oak and pine account for over 50 per cent of the volume and 18 other species groups make up the balance. The volume contained in poletimber trees is 12,741 thousand cords. (A cord contains 128 cubic feet of stacked wood.) This is 60 per cent of the total volume (with sawtimber expressed in cords). The species with the greatest cord-volume are the same as for sawtimber. The inventory of all sizes is about

TABLE 1
NET TIMBER VOLUME ON COMMERCIAL FOREST LAND BY SPECIES

Species	Sawtimber[1] millon board feet	Poletimber[2] thousand cords
Pine, shortleaf	551	1,234
Cypress	13	—
Redcedar	2	43
All softwoods	566	1,277
Oak, white	577	2,221
Oak, post	322	1,401
Oak, other white	20	96
Oak, black	708	3,214
Oak, scarlet	389	1,589
Oak, northern red	136	405
Oak, other red	118	512
Hickories	241	1,323
Maple, hard	38	88
Birch	1	13
Black walnut	6	83
Ash	14	59
Elm	42	196
Maple, soft	6	11
Sweetgum	22	97
Blackgum	24	44
Cottonwood	5	6
Sycamore	26	26
Other hardwoods	37	80
All hardwoods	2,732	11,464
All species	3,298	12,741

[1] Trees 11 inches and larger in diameter, 4.5 feet above ground level.
[2] Trees 5 to 10 inches in diameter, 4.5 feet above ground level.

85 per cent hardwoods and the oaks make up a large portion of it. Hence, even though industries based on using pine for poles, lumber and other products will be of growing importance, the major development in wood-using industries must be geared to those that can use hardwoods.

The central theme of forest management concerns the manipulation of tree growing stock to replace, build up and improve tree inventories as rapidly as possible. Changes in growing stock are taking place rapidly in the Eastern Ozarks. The volume of growing stock in both poletimber trees and sawtimber trees increased 36 per cent since 1947. The sawtimber portion increased 10 per cent. Shortleaf pine made the most pronounced increase in sawtimber volume—90 per cent—and several species of oak increased substantially.

These changes took place while harvests of wood amounting to 100 to 150 million board feet anually were occurring. Systematic planning and cutting practices designed to improve the remaining tree stands are still not common but continued fire protection and the rudiments of conservative cutting are catching on with both landowners and industries.

WOOD-USING INDUSTRIES

Industries that use wood as raw or basic material are usually divided into two groups. One group known as the primary manufacturing industries is concerned with initial conversion of a tree into a product that is not round—such as lumber. It also includes the processing of products which are used in the round form by the consumer, such as round fence posts that have been treated with a wood preservative. Firms in this group include independent operators that fell the tree, cut it into sections called logs or bolts, move it out of the woods and truck it to a processing plant. Frequently the logging job is done by employees of a firm that operates a plant to process wood into lumber or other products. For the most part, primary industries are small, independently-owned firms that employ less than a dozen persons. Many are family affairs. The owner usually participates physically in the work as well as performing a supervisory function. Sometimes his wages are the only return he receives. Some enterprises are poorly financed and are run with an astonishing lack of equipment, technical know-how and business acumen. This is particularly true of small sawmills. The small amount of working capital on which they operate requires that their products be sold weekly in order to meet payrolls and other operating expenses. Business failures are common and the number of firms in operation fluctuates with current demand. When the price of lumber declines, marginal mills go out of business or at least become inactive until prices rise.

Further conversion of primary products to more finished items is known as secondary manufacture. This group includes firms which produce furniture, flooring or other products that are cut or shaped from rough lumber or heavier dimension stock.

Products and Output

Forest landowners find their largest market for standing timber that is sawed into lumber. More than 60 per cent of the timber cut in Missouri is sawed into lumber and about one-third of the total annual state production comes from the Eastern Ozark region. The low point in lumber production in Missouri was 140 million board feet in 1932 and the high was 519 million board feet in 1946. Production in recent years has

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been estimated at 300 to 400 million feet. Almost 90 per cent of the lumber is hardwood. Hardwood lumber demand is expected to increase 33 to 66 per cent by 1975, primarily because of a swellng population rather than an increased per capita consumption.

A typical small sawmill consists of a 52-inch circular saw powered by an engine fueled with Diesel fuel or gasoline. (Old Buick motors turn a circular saw long after the rest of the car is in the scrap metal market.) Logs are held on a carriage which is moved past the saw. The equipment may be housed under an open shed. A pair of smaller saws may be used to "edge" the bark from boards. Better equipped mills have a cut-off saw to cut boards to length as well as conveyors, fork lift trucks, electric or hydraulic controls and other refinements. Recent trends, as in many industries, are toward the use of more machines and less labor.

During the summer of 1960, a complete enumeration of sawmills and other primary manufacturing industries[5] in the 14-county area was made which showed that 357 sawmills were in operation and 32 were inactive (Table 2). These firms employed 1,573 persons including one owner or manager per mill. Approximately another 1,500 persons are engaged in cutting and delivering logs to sawmills. Employment is somewhat irregular in many mills because of shutdowns resulting from bad weather, fluctuations in supply of logs and the market for rough green lumber, and equipment breakdown. Total production for 1959 was 125,516 M board feet, about 30 per cent of the estimated state production.

The smallest mills, one-third of the total number, sawed less than 100 M feet each. They should be regarded as part-time operations or those that specialize in intermittent custom sawing for farmers or other local customers. Forty-four per cent of the mills produced from 100 to 499 M feet and employed almost 40 per cent of the sawmill workers. Many operate as part-time business or saw regularly with very small crews. Sawmill efficiency depends in large measure on having an adequate crew. It was found that output per man varied directly with the number employed, at least for the size and type of mills in operation:

The 37 mills that produced over 1 million feet anually were the most efficient. Only 10 per cent of the total number, they employed 22 per cent of the workers and produced 45 per cent of the

TABLE 2
NUMBER OF ACTIVE SAWMILLS, EMPLOYEES AND LUMBER PRODUCTION BY MILL-PRODUCTION CLASS, 1959

Mill-production class[1]	Mills[2]		Employees		Total Annual Output	
	Number	Percent	Number	Percent	Thousand bd. ft.	Percent
1-99	116	32.5	310	19.6	5,927	4.8
100-499	158	44.2	613	38.4	33,429	26.6
500-999	46	12.9	300	14.2	29,725	23.6
1000-5000	37	10.4	350	22.3	56,435	45.0
All sizes	357	100.0	1,573	100.0	125,516	100.0

[1] Annual production in thousands of board feet lumber tally.
[2] Not including 32 small mills which were inactive in 1959.

[5] In connection with Project 406, Marketing Timber Products, Forestry Department, Missouri Agricultural Experiment Station.

Number of workers	Annual output per man, M bd. ft.
3	30
6	90
9	150

lumber. The three largest mill production classes included two-thirds of the mills, employed 80 per cent of the workers and accounted for 95 per cent of the lumber produced.

For 1947 there were 763 sawmills reported for the Eastern Ozark region.[6] The reduction to 357 by 1959 (47 per cent) is explainable. During World War II, the maximum production of lumber was encouraged and lumber prices, though controlled, were attractive. Previously inactive mills resumed sawing and new mills appeared. Unusually high demands continued after the war and prices soared when controls were lifted. In the 1950's demand gradually declined and prices dropped. Many marginal producers were forced to go out of business and others found more attractive work.

For convenience in discussion, the products made from wood other than lumber have been grouped into several classes. Production estimates of these products are given in Table 3. Rough lumber, primarily oak and other hardwoods, is further processed into flooring, furniture and molding. These products use 82 per cent of the oak lumber produced in the United States. Charcoal was being made more than a century ago for use in iron smelting. Later, volatile components (acetic acid, wood alcohol and other chemicals) were recovered for industrial use. As coke replaced charcoal in steel making and as the volatiles were produced more cheaply by synthetic processes, charcoal making dwindled to almost nothing. A post-war renaissance in backyard barbequeing revitalized charcoaling into a prosperous and expanding industry. People at a beach party in California or on the Atlantic Coast may well be using Missouri charcoal. Missouri now produces 10 per cent of the charcoal made in the United States and 40 per cent of this is made in the Eastern Ozarks. A typical firm consists of 6 or 7 kilns each the size of a four-car garage in which dry oak and hickory wood is burned with air partially excluded. Volatiles are not recovered. The making of charcoal is an art acquired by long experience—jealously guarded by most kiln operators.

The manufacture of barrel staves, though important in Missouri, is relatively unimportant in this region. Most staves are used for tight cooperage—barrels that hold liquids. White oak is required because the pores of the wood are occluded with mica-like partitions that prevent leakage. Tight cooperage is used chiefly to age and store Bourbon whiskey. Because each stave must be curved to form a barrel with round sides, an unusual cylindrical saw with teeth at one end is employed to saw staves with a curved shape. Barrels for other purposes such as packing meat, nails, flour, or bulk metal parts, called slack cooperage, have been largely replaced by paperboard cartons or multiwall paper sacks. However, the wood barrel is competitive cost-wise in some areas. A firm in Poplar Bluff still makes slack cooperage from several species of wood.

Handles are of two general groups: (1) those used for striking tools such as hammers and axes and (2) other hand tools—rakes, shovels and brooms. For striking tools, hickory is preferred because of its toughness and resistance to

[6] King, D. B., E. V. Roberts and R. K. Winters. **Forest Resources and Industries of Missouri.** Mo. Agr. Expt. Sta. Res. Bul. 452, Dec. 1949.

TABLE 3

NUMBER OF PLANTS, RAW MATERIAL AND ANNUAL PRODUCTION BY INDUSTRIES OTHER THAN SAWMILLS, 1959.

Product	Number of plants	Species of wood used	Wood purchased	Annual output
Flooring	3	oak	42,500 M bd. ft.	36,000 M bd. ft.
Charcoal	11	oak, hickory	48,113 cords	18,442 tons
Barrel staves[1]	6	white oak, misc.[2]	503,000 cord ft.[3]	1,394,000 net staves[4]
Handles	3	hickory, ash	3,504 cords	61,250 dozen
Handle blanks[5]	4	hickory, ash	1,491 cords	4,545,450 pieces
Post and poles[6]	9	pine	1,768,445 pieces	1,768,445 pieces
Miscellaneous[7]	5	persimmon, gum walnut, ash, maple hackberry, hickory	1,491 cords	1,666,750 pieces

[1] Includes one manufacturer of slack cooperage staves, to avoid disclosure of individual data. Slack staves are used in barrels that do not hold liquids: meat, nails, bulk metal objects. Five mills, accounting for most of the output, produce tight cooperage staves used for storing Bourbon Whiskey.

[2] White oak used for Bourbon staves; gum, elm, hackberry, ash and other species used for slack cooperage.

[3] A stave bolt that is 39 inches long and measures 12 inches across a cord on the end of the piece from one point to the opposite point on the circumference of the heartwood contains 1 cord foot. The estimate includes slack stave bolts expressed in cord feet.

[4] A net stave is 4.5 inches in width and 36 inches in length. Estimate includes heading and slack staves expressed as net staves.

[5] Rough blanks that are shipped out of the region for processing into finished handles.

[6] Sizes from 2 inches in top diameter and 6.5 feet in length to 6 inches in top diameter and 35 feet in length.

[7] Dimension stock or rough shapes for special handles, furniture, golf club heads, tent stakes, saw wedges for logging.

shock. Handles for shovels and rakes usually are made from hickory and ash. Many other species can be used for broom and mop handles because less stress is encountered in service. In the Eastern Ozarks, most of the handles produced are for striking tools. Three firms make finished handles and four others produce rough handle blanks that are sold to handle manufacturers outside the region.

An expanding industry which began only 15 years ago, is the production of pine fence posts and small poles. Continued fire protection and effective seed crops have resulted in the establishment of dense stands of pine. As these stands reach 20 to 30 years of age, a huge volume of post-and-pole-sized trees develops. If existing pine stands were thinned properly, it is estimated that 5.5 million posts and poles could be harvested annually, with no need to destructively cut entire stands. The current annual harvest of 1.8 million small pine trees and the fact that the pine growing stock increased 89 per cent in the past 12 years indicates that the post and pole harvest is not excessive, indeed it can be increased.

The miscellaneous-product group includes unusual items: specialized handle stock, furniture stock such as table legs, golf club heads, tent stakes and saw wedges. One firm supplied several hundred thousand tent stakes for the 1960 Boy Scout Jamboree at Colorado Springs, Colorado. Golf clubs with wood heads require a tough, resilient wood to withstand shock. Persimmon meets this exacting requirement. Saw wedges are used

by loggers to prevent saw blades from binding in a log and to control the direction of fall of a tree. Dogwood and hickory wedges are capable of withstanding heavy, crushing loads without splitting. Missouri producers of saw wedges have customers in the mountain and Pacific states as well as nearby.

Estimates of production were not obtained for several products. Railroad ties are sawed from the lower-grade center portion of logs. The volume of production is included as lumber in that of sawmills. Ties are sold by sawmill operators to buyers at concentration yards, frequently run by wood preservation firms. Ties are shipped to treating plants outside the region for preservative treatment and sale to railroads. Occasional large high-quality white oak and red oak are harvested that will yield a defect-free log suitable for slicing into thin veneers used in the manufacture of furniture. Veneer trees are literally few and far between. Buyers, frequently representing Indiana firms, buy logs and ship them by rail for processing at distant plants. About 6 producers make mine props from small, straight hardwood trees which are shipped to southern Illinois mine fields. The market for mine props has diminished greatly because bracing in mines is now commonly done to the ceiling of the mine tunnel by steel rods set in bored holes.

Table 3 shows that the most important products, other than hardwood lumber, in terms of volume of wood required are oak flooring, charcoal, pine posts and poles, and white oak staves.

Employment and Values Produced

Table 4 shows that 2,395 persons were employed in wood-processing plants in 1959 and 2,614 were engaged in supplying logs and bolts to them. This includes owners and managers. Workers in flooring and charcoal plants enjoy steady work throughout the year. Others are made idle by weather and the vagaries of markets for wood products. Plants alternately rush at full capacity or idle along or even close temporarily. This is reflected in irregular employment for woods workers by suppliers of logs and bolts. A large portion of the 2,614 woods workers probably have other activities such as farming to supplement wages earned by cutting timber.

Interviews with plant owners, along with the application of labor factors, provided the estimate of payrolls in Table 4. In 1959, workers in the wood-using industries earned $5,508,000. Over one-half of the earnings were paid to sawmill workers who are not highly paid, but there are many of them. Flooring plant workers earned 25 per cent of the total and those producing posts and poles received 9 per cent.

The value of products manufactured in 1959 is given in Table 5. The sales values at plants of all products was $15,312,000. Landowners and loggers received $4,358,000 for raw material supplied to plants. The value added by all maunfacturing processes was $10,738,000. Part of this amount was for purchases of equipment, power, water, and supplies. This contributed to the business of merchants both within and outside the area. Table 5 emphasizes the importance of the lumber and flooring industries. No attempt was made to evaluate the return received by owners of wood industries. Worley,[7] in a study in eastern Kentucky, reported that margins unaccounted for by receipts and expenditures in successful sawmill businesses averaged 16 per cent of lumber sales. Flooring firm margins averaged 11 per cent of product value. Such margins,

[7] Worley, D. P., **Local Benefits from Timber Industry Expansion.** Central States Forest Expt. Sta. Tech. Paper 172, May 1960.

of course, did not indicate profits because of variations among the concerns in taxes and other costs. Worley studied successful concerns. The firms included in this study probably have smaller margins, particularly a large number of inefficiently operated sawmills.

many of them occupying space without growing could be removed from the stand to make room for better ones. With a market available, timber improvement cuts could yield immediate returns. Difficulties are encountered since there are few industres which can use low-quality,

TABLE 4
EMPLOYMENT AND ESTIMATED ANNUAL PAYROLLS IN THE WOOD-USING INDUSTRIES, 1959

Product	Persons employed		Total estimated payrolls
	At plants	By suppliers[1]	
	Number		Thousand dollars
Rough lumber	1,573	500	2,887
Flooring	500	—[2]	1,380
Charcoal	74	247	444
Barrel staves	81	700	42
Handles	52	202	148
Handle blanks	11	85	34
Posts and poles	87	720	510
Miscellaneous	17	160	63
Total	2,395	2,614	5,508

[1] Largely part-time workers.
[2] Included under rough lumber, the raw material for flooring.

TABLE 5
VALUE OF WOOD PURCHASES, MANUFACTURING AND PRODUCTS SOLD, 1959

Product	Purchases of wood	Value added by manufacture	Value of products f.o.b. plants
	Thousand dollars		
Rough lumber	1,255	6,778	8,033
Flooring	2,124[1]	2,595	4,935
Charcoal	336	370	706
Barrel staves	33	62	95
Handles	103	241	344
Handle blanks	32	38	70
Posts and poles	408	592	1,000
Miscellaneous	67	62	129
Total	4,358	10,738	15,312

[1] Rough lumber delivered to plants.

Industrial Potential

As the forest resource is restored, an expansion of wood-using industries can be supported. The greatest need at the present time from the point of view of improving tree quality in the forest is a market for low-quality trees. These, defective trees. Ordinarily the wood industries prefer straight, sound wood to reduce cost of handling and loss in processing. It is possible, however, that firms which manufacture particle board or paper products, finding this area attractive in the future, will provide a

market for trees not marketable under current conditions.

With the present markets for wood, it appears that the greatest advance can be made by carrying processing to the finished-product stage in the locality where the wood was grown. It is believed that an unknown but substantial portion of the wood harvested is processed outside Missouri into a form in which it ultimately reaches consumers. Worley[8] showed that an integrated wood business producing 2 million board feet annually of air-dried, dressed lumber, siding, molding, and specialty products such as truck beds—as contrasted to a sawmill producing the same volume of green lumber—can change its receipts and expenditures as follows:

Value of	Increase, times
Receipts	
Sales	2.1
Expenditures	
Purchase of wood	1.0
Payroll	2.3
Equipment	3.7
Power	2.2
Other	2.3
Unaccounted for margin	2.6

These ratios are based on an increase in receipts from $123,900 to $259,600 and an increase in expenditures from $104,500 to $209,600. It appears possible to double sales from the same amount of raw material. Increased processing is attended by a greater increase in the return to both labor and capital, in this case 2½ times greater.

Markets for wood are less organized and formal than for other products. Buyers rely on word-of-mouth and postcards to control production of logs and bolts from known suppliers. It is a workable system, but not the best. There is a lack of communication between the buyer and potential sources of supply with which he has had no previous contact. This is especially true for landowners who want to sell trees. They may be able to find a buyer or two, but often it is difficult to locate buyers who represent several firms or different types of industry. The seller who infrequently markets wood experiences trouble in understanding product specifications, measurement of volumes, and changes in specifications and volume requirements that occur.

Organized buying by combinations of firms and industries could reach a greater number of suppliers. High-quality wood could be channeled to industries that require it and those using lower grades could buy at less cost. The establishment of concentration yards by industries or by independent brokers could do much to provide a known reliable market for landowners and loggers and it could assist industries in procuring the kind of wood they require. It could prevent the utilization of veneer-quality logs for lumber. Veneer logs from many sources, each with an amount so small that a buyer was not attracted, could be accumulated and offered for sale in a quantity that would interest buyers.

Marketing research can point out inequities and weak points. Perhaps it can suggest means of helping the wood-using industries and landowners, but these groups must first see the desirability of market improvement and only they can accomplish it.

It is apparent that forests are making a significant contribution to the economy of the region. It is estimated that once the timber resource is restored to its maximum productive level a harvest of 4 times the present volume can be sustained with corresponding gains in industrial activity and employment.

[8] op. cit.

The Role of the Economist in an Industrial Organization

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Businessmen are confronted with many questions in the everyday activities of buying, manufacturing, and selling. Some questions are in the technical field. Some are in the legal field. But many are in the fields of economic theory, monetary theory, foreign trade, and business activity outside the businessman's immediate industry. Questions arising from the interaction of forces in the economic realm particularly concern the business economist.

PRINCIPAL FUNCTION

An economist is an adviser. He is seldom a policy maker. He is not usually an operating man. He is a staff man. While some economists do have responsibility for preparing sales forecasts or construction forecasts, for example, they are not operating as economists in those activities, but as marketing men or in similar activities. The principal function of a business economist is to study and interpret general business conditions and trends, to point out the probable results of proposed policies or actions, to provide perspective by reviewing economic history. Frequently the economist is called upon to estimate what the business "climate" may be a year or two, or five, or ten years ahead. He is concerned primarily with long-term trends rather than with day-to-day happenings.

The economist is concerned with such questions as the rate of growth and the age composition of the population, with the trend of commodity prices, interest rates, and construction costs, with the volume and composition of construction activity in the country, with the level and trend of personal income, consumption expenditures, and saving, with business inventories, business spending for plant and equipment, government expenditures, etc. These are some of the factors that determine or affect the level of activity in the automobile industry, the textile industry, the chemical industry, or in almost any other industry. These are some of the basic factors that affect all industry.

One difficulty with translating such information into a forecast of a particular industry's sales, or the sales of a partic-

ular company, is that these factors do not operate with equal intensity in all industries or companies. Although we speak of "industries" as though they were quite homogeneous, actually most industries are quite heterogeneous. Just think of the steel industry, or the machinery industry, or metal fabricating, or the textile industry, or even the chemical industry.

The chemical industry has about 7 per cent of the total weight in the Federal Reserve Board Index of Industrial Production, about equal to the weight of primary metals, or textile, apparel, and leather products, or the production of coal, oil, and natural gas. The chemical industry produces such diverse commodities as acids and other inorganic chemicals, plastics, man-made fibers, soap, paint, drugs and medicines, and atomic energy. No one company covers the whole range of chemical products. Even du Pont, the largest chemical company in the country, accounts for only 8 per cent of the sales of the Chemicals and Products Industry.

RESEARCH ORGANIZATION

The position of the company economist is not the same in all companies. Some industrial economists report to the President, or the Executive Vice President, or the Financial Vice President, or the Vice President in charge of sales, or the Treasurer. We report to the Executive Committee, the top day-to-day operating authority in the du Pont Company, as do all other Manufacturing and Auxiliary Departments of the Company. There is no standard pattern. Economic research may be fitted into the company organization in a variety of ways.

Nor is there any standard pattern of what areas of activity are covered by the economist. Economic research is usually what the incumbent makes it, or it covers the areas a particular supervisor may want covered. Let us take our situation in the du Pont Company for illustration.

My staff includes four men and four women. One man has the Doctor's degree in Economics and three have the Master's degree in Business Administration.

Although all our men are familiar with the broad areas of economic research, there is some degree of specialization. One man is an expert on commodity price trends. He maintains the Company's Index of Market Prices of Principal Purchases, covering some 47 commodities or commodity groups. He also maintains our file of current and historical economic data, covering some 500 series, some daily, some weekly, most of them monthly, and some only annually. The purpose of this file is to have readily available some of the facts upon which business decisions must rest. We issue much of this information in the form of tables and charts for ready reference, usually once each year. We pride ourselves on having these data available on a historical basis, much of the older material now being out of print. This man has also had broad experience in studies of government finance, industrial investment, the textile industry, the agricultural situation, etc.

My second man covers such diverse fields as economic theory, population growth, the construction industry, estimates of the Gross National Product by principal segments, using a large computer to develop seasonal adjustment factors, and plant location. He is responsible for reviewing economic discussions in Company publications, and for special studies of new plant locations in the United States and abroad. He is also an accomplished public speaker, and we receive many requests to speak on the business situation and the outlook.

My third man has a background in

chemical market research. He maintains the Company's sales price index, which covers all manufacturing departments and divisions of the Company. It is prepared monthly and is available by the ninth working day of the following month. He also handles a variety of problems in the field of sales forecasting and market analysis.

My fourth man has a background in labor economics. He is responsible for studies of labor productivity, the "leading indicator" approach to short-term business forecasting developed by the National Bureau of Economic Research, and he also follows current literature in the field of economics.

Naturally, all of us are familar with the general economic research tools of price indices, the Federal Reserve Board Index of Industrial Production, the Gross National Product, employment, business inventories, money and credit, etc.

OPERATING DEPARTMENT RESEARCH

There are also other economists and economic groups in the Company. The Textile Fibers Department has a group, for example, concentrating on problems in the textile industry. There are also specialists in economic research in the Public Relations Department and the Development Department. These men are entirely independent of the Economist's Office, which I represent. There is a growing recognition of the contribution which can be made in the business world by men with thorough training in economics.

SHORT AND LONG-TERM NEEDS

Our work in the Economist's Office might be divided into two parts: Special studies and day-to-day activities. Much of our work is done in the form of special studies, some of which take a few days and some take a year. Basically, what we are trying to do is to present a balanced picture of the facts in a particular situation, usually in answer to a specific request. We may also initiate studies. Some of the questions we have tried to answer are: What is the outlook for commodity prices, interest rates, and construction costs? What is the growth rate likely to be over the next 10 years in our economy, the chemical industry, the automobile industry, or in the textile industry? What will du Pont employment be in 1980? What is the outlook for United States foreign trade with the various countries of the world? What are the important factors we should consider in plant location—other than the engineering, raw materials, or market data? What is the economic significance of personal saving, consumer credit, government debt, "tight" money, inflation, our monetary gold stock, etc.?

Obviously, we do not have answers to all these questions, but we can present the basic facts in some cases, or the probable development in others. We try to take a long look to avoid merely projecting short-run changes. We go back frequently to 1939 or to 1926, for example, in our comparisons rather than restricting our studies to the period since World War II. There were other periods of high interest rates, or rising prices, or heavy plant and equipment spending before 1959. All these studies help us to keep current developments in perspective and they have a bearing on our analysis of the business outlook.

We also make estimates of the probable level of business activity or prices for a year or two ahead and sometimes for ten years ahead. These estimates are used for background material for the

manufacturing departments in the preparation of their sales forecasts. They include the probable level of industrial production, wage rates in manufacturing, wholesale prices, and the probable level of our Index of Prices of Purchased Materials. Naturally, the departments are not required to use our estimates, but they are expected to indicate significant differences if they use other assumptions in making their sales forecasts.

REPORTING TECHNIQUES

Our studies are presented in the form of more or less formal reports with a maximum of charts and a minimum of text. We are fortunate in having available to us the facilities of the chart group who maintain the Company's Executive Committee Control Charts. These people are all professionals who can design and draw a chart with a minimum of supervision. Most of our charts are line charts on a semi-logarithmic scale to emphasize rates of change. Much of the material is presented in the form of index numbers with the 1947-49 average as a base to permit ready comparison with the Federal Reserve Board Index of Industrial Production, the Wholesale Price Indices of the United States Bureau of Labor Statistics, or the Consumer Price Index. We also maintain some charts on a 1939 base to make readily apparent the magnitude of the changes which have occurred in this country since 1939.

In addition to these more formal studies, we have a responsibility for helping other departments in the Company with their economic and statistical problems—suggesting where particular information may be found, or what price index to use for a particular purpose, or what statistical series might parallel a particular du Pont figure, or what production of particular commodities may be in a specific period. We also help by reviewing economic statements in projected speeches or articles, by presenting economic arguments in every-day business problems, and by advising in the computation of seasonal indices, special price indices, etc. Such activities are time consuming, and we have only a small staff, but we are a service organization. We can often help with the solution of a problem even though we can't do the entire job.

We also present much of our material orally for regularly scheduled meetings of various groups of our executives. These presentations usually consist of a quick review of some of the current business happenings and trends, the causal factors, and the outlook. The purpose of these reviews is to summarize current business developments for busy men whose principal interest may be in production, sales, finance, purchasing, or employee relations. An economist can make a real contribution here because he has a broad range of interests and he can stress the probable result of trends he sees developing rather than merely reporting current events.

REPRESENTING THE FIRM

We are also available to talk with other groups about the state of the economy, the probable business outlook, some of the more important trends in our economy, and basic economics. We receive frequent calls for such talks from sales training groups in the Company, departmental staff groups, du Pont employee organizations at our large plants or district sales offices, from some du Pont customers, from professional societies, from universities, etc. We think this is an important part of our work because we feel the need to spread the knowledge of basic economic principles.

You will note that it would be difficult to identify the chemical industry from most of the above discussion of the work of the Economist's Office. We do very little direct work in the area of market research or company sales forecasting. Our principal activities are in the broad areas of national economic trends. We can provide information on the probable business level which will prevail in the country in the next year or at some other future time, but we cannot, of course, estimate how many pounds of cellophane we may sell in a given period, or how much paint, or sodium, or tetraethyl lead, or X-ray film, or Nylon, we may be able to sell. However, when men who are familiar with these products and with their markets have estimated their sales, we can be helpful to Management by estimating the "reasonableness" of the completed forecast in view of the probable business outlook.

In summary, the Economist's Office of the du Pont Company is concerned with analysing and interpreting a broad selection of economic data for the purpose of assisting Management in its day-to-day decisions. Much of our work deals with projections into the future, usually on the basis of past trends, or new trends we see developing. We rely almost entirely on published information and on our interpretation of basic economic principles. We try to stick to the facts rather than to rely on hunches. We are interested in long-range trends rather than in day-to-day fluctuations. While we make few elaborate economic analyses, we do answer a variety of questions every day. We are a service organization.

Survey of Management Information Needs–What, Why, and How?

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MANAGEMENT CHALLENGES THE ACCOUNTANT

From time to time management has accused the accountant of various "sins" such as—not enough information, too much information, information too late to be of use, no basis provided for comparison or judgment, too complicated, does not focus upon problem areas, does not pertain to my responsibilities, too much emphasis upon the reporting of the historical past.

In many instances these accusations are of a conflicting nature, and as a result, many accountants are prone to pass them off as of little real content. The important point to note, however, is that there is a sizable amount of management dissatisfaction with the results of accounting, and that, consequently, the managerial usefulness of accounting must in many instances be open to serious question.

The position taken in this paper is that accountants, generally, should reappraise their individual contribution to management. What type of tool are they providing for their company managers? Does it fit the hand of the manager it is designed for? Is it on hand when needed? How sharp is its edge? Can it be depended upon under normal and abnormal usage? Does it need to be overhauled or replaced?

If an accounting system is to be a useful tool for management it must be tailor-made to fit the specific requirements of the enterprise and its managerial staff. The starting point should be a thorough analysis of the enterprise in which the system is to function. The purpose of this analysis is to discover the informational needs of the different members of the management team in order that the accounting system can be designed to furnish what is needed at minimum clerical cost.

IMPORTANCE OF SOUND ORGANIZATION

No one can determine the specific information needs of the different members of the management team until a sound organizational structure has been established. This problem rests at the doorstep of management, not the ac-

countant. Before criticizing the accountant for his failure to provide adequate information, management should first examine the organizational setup of the enterprise to assure that areas of responsibility and scopes of authority are clearly defined and understood for each management position from the top management level down to the supervisors of the smallest department or section. Only after this has been accomplished can anyone determine what types of information are needed by the different members of the management team.

These principles apply to managers occupying staff positions at the various levels, as well as managers occupying line positions. Each member of the management hierarchy should know specifically whom he is responsible to, what operations or functions he is responsible for, and what personnel and facilities are under his control. He should also know the types of decisions he has the authority to make alone and which decisions he must refer to his superior. The relationships between line and staff positions must be spelled out with special care to avoid problems of conflicting responsibility and authority.

The organizational structure may be designed along product lines, regional lines, functional lines or a combination of these, whichever appears to be best for the size and complexity of the business enterprise. Regardless of the approach taken here, the important point is that the organizational structure should avoid overlapping responsibilities and overlapping authorities in so far as this is possible. Sound organization is so important that it is ordinarily advisable to prepare a **manual of organization** setting forth the specific responsibilities and authorities of each management position and to review and refine these relationships as necessary to make them conform with current policy and practice. If the organizational structure of an enterprise is not soundly conceived, the accounting system at best will be only a management crutch, not a managerial tool.

SURVEY OF INFORMATION NEEDS

Assuming that a sound organizational structure has been achieved, the informational needs of individual managers can be determined by studying the types of problems each manager is confronted with. This problem may be broken down as follows:

1. Specifically what are his major problems?
2. What are the earliest signals of the existence of each problem?
3. How important is each problem in relation to the success of his function and the enterprise as a whole?
4. When and how often does each problem arise?
5. What considerations are needed to decide how to solve the problem?
6. What types of decisions or actions are used to solve the problem?
7. How difficult is it to achieve a solution?

The problems of the manager should be quite clear to him. They are the result of the responsibility and authority delegated to him, and the operating conditions under which he operates. Every manager with on-the-job experience in the position he is assigned to should be able to formulate these problems as a starting point for the survey of management information needs.

MANAGEMENT PROBLEMS

Quite naturally the specific problems of one manager will differ from those of other managers. In a very general way, however, the problems of every manager

can be classified under the following headings.

1. Problems of planning future operations.
2. Problems of directing current operations.
3. Problems of evaluating past performance.

The overall character of management is decision making regarding the efforts of the group of individuals working under the manager. Thus the problems of a manager can be stated best in terms of the decisions which he must make.

Before a manager can even consider possible solutions to a problem, he must first be made aware of the existence of the problem. It is especially important, therefore, that the earliest signals of the existence of the problem be provided for. Oftentimes this signal constitutes information which the accountant normally does not collect. For example, a decline in sales may be signalled a month or more in advance by a decline in unfilled orders; raw material supply shortages by late deliveries, etc.

Consideration should be given to the relative importance of individual management problems. The accountant cannot be expected to gather and present detailed information especially designed for solving every management problem. The bookkeeping workload and clerical cost would soon become prohibitive, and furthermore, the managers would be drowned in accounting reports. Each management problem should be ranked according to its importance in relation to the success of the manager's function and the enterprise as a whole. Then the greatest accounting effort and expense can be spent where it will do the most good. Less important management problems can still be served, but not in such a comprehensive manner.

HELPING THE MANAGER

In order that information will be made available when it is needed, the accountant must know just when, and how often, each management problem is likely to arise. This together with knowledge as to the importance of each problem, determines the timing of the submission of accounting information.

The thought process which the manager follows in arriving at a decision, to a large extent, determines the type of information which he needs in order to make a sound decision. It is in this area that the accountant may be able to make a most valuable contribution. It has become more and more apparent that a good business executive is not necessarily a good accountant. He must have the necessary temperament and skills for making decisions, for organizing operations within his own special field, and for managing subordinates, but he often has only a vague idea of the types of information which will be most useful for the solution of his own operating problems. He seldom understands enough about the capabilities and limitations of accounting and statistical methods to enable him to determine the most effective way of compiling and presenting these data, or to interpret them accurately after they have been presented. By filling this void, the accountant can help the manager to do a better job of planning his own information needs and of making more effective use of information in the solution of his problems.

Emphasis should be given to the fact that information for the solution of problems is usually different from information which identifies the existence of problems. Both types of informational needs should be provided for. It is important to recognize the personal element regarding each manager's needs. In spite

of the stabilizing effect of overall company policy and the possibility of retraining by the accountant, managers will still differ one from the other in their approach to the solution of operating problems. This must be taken into account in building up a really effective list of informational needs tailor-made for the existing organization.

From an analysis of the type discussed above, perfected as time goes by, the accountant working with individual managers should be able to build up a survey of informational needs pertaining to each management position throughout the organization. This survey has distinct advantages, both to the accountant and to the managers themselves. The accountant is able to learn of the types of problems faced by individual managers and the thought processes by which they reason out solutions to their problems. With this knowledge the accountant can design the accounting system so that it provides each manager with the type of information which is best suited for his own needs. Individual managers also profit from the survey since they are forced to analyze, carefully and objectively, every aspect of their own operating problems and to reduce this analysis to a systematic list of principles.

An important by-product of this survey is to disclose weaknesses in the existing organizational structure. If the analysis is carefully made, it will reveal instances where responsibility and authority are not clearly defined, and where two or more management positions have overlapping responsibility and authority. It will also reveal weaknesses arising from the situation where, because of an unwise separation of responsibilities and authorities, important management problems can be solved only by a circuitous route of decisions and actions involving several different managers.

DESIGNING THE ACCOUNTING SYSTEM

Having compiled a survey of management information needs, the accountant must design or refine the accounting system so as to furnish what is needed at the lowest clerical cost.

In general this involves decisions regarding:

1. What specific type of information is needed?
2. Who should get the information?
3. In what form should it be presented?
4. When should it be presented?
5. How often should it be presented?
6. What is the original source of the information?
7. How should it be processed before it is to be reported?

A complete discussion of accounting systems is beyond the scope of this paper. However, certain principles which underlie the design of an efficient accounting system should be discussed in order to show how the accountant can provide a better tool for management. If it has been properly prepared, the survey of management information needs will provide direct answers to the first five questions indicated above. These are basic questions which the accountant cannot answer alone. As pointed out earlier, individual managers also are not in a position to answer these questions alone. The answers must be compiled jointly by the accountant and the managers working together. The answers to the last two questions should be provided by the accountant utilizing his technical knowledge of accounting and statistics.

Note that the starting point in designing or refining the accounting system actually is the end product of the system —the information which management needs. The important point is that the system should be designed to meet man-

agement information needs, not that the information should be designed to meet the accounting system's needs. Naturally where information needs can be served equally well by different system approaches, the accountant should choose the system approach which is least expensive.

The elements which make up practically every accounting system may be listed as follows:

1. Transaction documents
2. Subsidiary ledgers
3. Journals
4. The general ledger
5. Work sheets
6. Management reports

In designing an accounting system, the accountant must organize the relationships which exist between these various elements and set up the procedures and facilities to process data until it is presented as management reports.

In general, three different types of reports should be distinguished:

1. Historical reports
2. Current performance reports
3. Future performance reports

Different approaches ordinarily must be used in processing data for these reports.

Historical reports furnish information regarding what has happened in the past. They provide data which is useful in appraising past performance and in judging the financial condition of the firm on specific dates. The primary examples of this type of report are the income statement, the statement of retained earnings, and the balance sheet, with supporting schedules as necessary to furnish details regarding specific statement items. The information contained in historical reports is largely water over the dam and, therefore, is not particularly useful in controlling operations. However, this type of information is essential for overall review of operations by top management, stockholders, and investors; for income tax computations, for loan applications, and for reporting to interested governmental agencies and the general public.

Information for historical reports comes from the general ledger and is verified and adjusted through the use of work sheets. This information may be supplemented by details taken from subsidiary ledgers.

Current performance reports are prepared for internal control over operations. They should be designed to furnish significant timely information regarding the most important factors governing the success of the enterprise. They should relate to current activities since this is the only area over which control can be exercised. The reports should be analytical, i.e., they should fix responsibility, provide comparisons, focus attention on problem areas, and explain causes for the performance reported.

Current performance reports should be furnished not only to top management, but also to the lower levels of management. The type and comprehensiveness of information, and the frequency of reporting should vary, of course, depending upon the level of management to which the report is directed. In each case the report should focus upon the operational matters with which the manager is concerned and for which he is responsible.

Some examples of current performance reports are:

(a) Monthly or weekly **report of operating expenses** by department, division, territory, etc., with comparisons with budgeted expenses, or with prior periods.

(b) Monthly or weekly **report of inventory position** by product category.

(c) Weekly or daily **report of idle time or overtime** by department, division, territory, etc.

(d) Weekly or daily **report of net sales or orders received** by product category, sales territory, etc.

(e) Weekly or daily **report of cash position.**

(f) Monthly or weekly **report of accounts receivable overdue.**

Information for current performance reports may be obtained from a variety of sources depending upon the nature of the information required, the design of the accounting system, and the frequency of reporting. A primary source of information is the subsidiary ledgers. In certain situations, however, it may be necessary to adjust the subsidiary ledger data through the use of work sheets or to take the information directly from the journals or even from the original transaction documents. For example, monthly or weekly reports of operating expenses by departments can be taken from the subsidiary ledgers for selling and general expenses if these ledgers are set up with separate accounts for each department. If not, it may be necessary to construct a work sheet for distribution of expenses to department, or even to resort to a detailed reclassification of original transaction documents. A weekly or daily report of idle time or overtime probably would be prepared directly from the time cards which are the original transaction documents for labor.

Future performance reports are prepared for planning purposes, and as a means of controlling future operations. They are useful to management in choosing the most advantageous course of action from among several alternatives which may be under consideration, and, once a particular course of action has been decided upon, they establish the program of operation and furnish a system of bench marks against which current performance may be judged.

Some examples of future performance reports are:

a. Forecasts of key economic factors with which the operations of the firm are closely related, i.e., U. S. disposable personal income, industrial production.
b. Forecasts of the firm's sales, production, inventory levels, etc.
c. Sales quotas by territory or salesman.
d. Budgeted operating expenses by department, division, or territory cost estimates.
e. Cost estimates.
f. Forecasted income statements.
g. Forecasted balance sheets.

The information for future performance reports must be developed to a considerable extent outside of the accounting system. The data recorded in the company's ledgers and other records are the result of previous transactions incurred under a plan of operations which to one degree or another is different from that programmed for the future. The usual procedure is to develop forecasted performance reports from work sheets, relying upon certain relationships taken from past experience, but revising the data through statistical or other means so that they reflect the conditions anticipated under the future program of operations.

SUMMARY

The accounting system should provide the information which management needs for the formulation of sound business decisions. Identification of the type of information needed, the persons who need it, and the timing of its submission is a problem which cannot be solved by the accountant working alone, or by individual managers working alone. It must be a cooperative project to which both the

accountant and the managers bring their individual talents and experience.

This paper advocates the use of a systematic, detailed, and continuing **survey of management information needs,** covering all management positions from the top management level down to the supervisors of the smallest department or section, including staff positions. Based upon such a survey, the accountant can design the accounting system so that it will provide the right information to the right persons at the right time. The benefits of an approach such as this are many, including better management information and its resulting beneficial effects upon operating performance, the discovery of weaknesses in the existing organizational structure, and economies in bookkeeping effort.

Research Notes

PROPOSED STUDY OF THE MISSOURI ECONOMY

In recent years some of Missouri's citizens have expressed fear that Missouri's economy has not kept pace with national developments. Statistics have been produced showing that population growth in the State lags behind national rates and that almost two-thirds of the counties have experienced losses; that personal income is not increasing at rates commensurate with those of the nation; that some segments of Missouri's agriculture are failing; that the rate of new industrial acquisitions is declining; that graduate programs in scientific and professional fields are not holding talented college graduates who, therefore, often seek their training in graduate schools located in nearby states.

On the other hand one can easily find persons who question, even refute, the possibility that Missouri is stagnating. The fact that some counties may be losing population, they suggest, may be beneficial in a long-term reallocation of the human resources of the State in response to very rapid technological changes in national production processes. An impartial analysis of the economy at this time would be particularly useful to businessmen, the press, government officials, trade association executives, and the interested public.

Periodic governmental releases of statistical information concerning the several phases of industrial activity in the State and nation, however valuable they may be, have not provided the basis for an adequate evaluation of Missouri's economy. The best available works on the Missouri economy either are dated or do not include a sufficiently broad range of business and economic activities to provide the reader with perspective for evaluating present conditions or to enable him to foresee areas that may be of critical importance in the future.

To provide a fresh base for appreciating developments in Missouri and Missouri's place in the national economic scheme of things the Faculty Advisory Committee to the Bureau has approved the initiation of an intensive study, tentatively called THE MISSOURI ECONOMY: *Development, Problems, and Prospects.*

The study will be state-wide in its approach and is intended to provide, when completed, background information concerning patterns of economic development in Missouri. Of even greater importance, however, will be analyses of current economic and business problems and of prospects for development which lie on the horizon. Population and employment patterns throughout the State will be subjected to intensive scrutiny, as will income data. Problems of urban growth and shifts in the economic activities of Missouri's people will be highlighted. Major categories of employment, and location of industrial activities in the State will be analyzed in the light of national and regional changes and prospects to pinpoint Missouri's development potentials.

In addition problems that have arisen for local government units, because of the increasing mobility of the population and the gradual dispersion of local responsibility, will be reviewed insofar as economic changes have been causal factors in breaking down the traditional patterns of local government structure and responsibility.

The study will be administered by the Bureau of Business and Economic Research in the School of Business and Public Administration and the talents of professorial staff members of several University of Missouri departments will be engaged in studying appropriate sectors of the economy.

Although project plans have not been entirely completed, it is anticipated that major portions of the work will be underway by March, 1961.

NEW APPOINTMENT TO THE BUREAU

Kenneth Everett Miller joined the staff of the Bureau on November 1. Mr. Miller had been with Armour and Company of Chicago since 1933, and had served as manager of the Economic Research Department of the large meat packing firm for the past ten years.

The work of the Bureau has expanded in recent months and members of the Faculty Advisory Committee to the Bureau have been formalizing plans for making an intensive study of the Missouri economy. Mr. Miller's experience and knowledge of the business activities associated with farm oriented enterprises and with processing industries makes him a valuable addition to the prospective project group who will work on the Missouri economic study.

Since much of Mr. Miller's work-load will fall within the confines of business and agriculture the University's School of Business and Public Administration and the College of Agriculture have jointly undertaken his appointment, the first such appointment between the two University schools. Mr. Miller will be a research associate in the Bureau and assistant professor of agricultural economics.